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December 23, 2002

FILE No. 022745-0094

VIA FEDEX

CALIFORNIA ENERGY COMMISSION
DOCKET UNIT, MS-4
Attn: Docket No. 02-AFC-02
1516 Ninth Street
Sacramento, California 95814-5512

Re: Salton Sea Geothermal Power Plant Project: CEC Docket No. 02-AFC-02

Dear Sir/ Madam:

Pursuant to California Energy Commission Siting Regulation §1209.5 and CEC Protocols for Electronic Proof of Service Pilot Project ("CEC Protocols"), enclosed herewith for filing please find the original copy of Applicant's document entitled, "Responses to California Unions for Reliable Energy Data Requests, Set One (Nos. 1 - 98)."

Please note that the enclosed submittal was filed today via electronic transfer (e-mail) to your attention and to all parties on the CEC's current electronic proof of service list pursuant to CEC Protocols.

Very truly yours,

Marian A. Harvey
of LATHAM & WATKINS

Enclosure

650 TOWN CENTER DRIVE, SUITE 2000 • COSTA MESA, CALIFORNIA 92626-1925
TELEPHONE: (714) 540-1235 • FAX: (714) 755-8290

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	)	Docket No. 02-AFC-02
	)	
Application for Certification,	)	**ELECTRONIC PROOF OF SERVICE**
for the SALTON SEA GEOTHERMAL UNIT 6	)	[Revised November 22, 2002]
POWER PLANT PROJECT	)	
by CE Obsidian Energy LLC	)	
	)	

I, Paul Kihm, declare that on December 23, 2002, I distributed copies of the attached:

APPLICANT'S RESPONSES TO CALIFORNIA UNIONS FOR RELIABLE ENERGY DATA REQUESTS, SET ONE (NOS. 1 – 98)

☒ Via electronic transfer (e-mail) addressed to the following:

docket@energy.state.ca.us	Energy Commission Docket Unit
pflint@energy.state.ca.us	Chairman Keese's Office
stomashe@energy.state.ca.us	Scott Tomashefsky, Adviser to Chairman Keese
cgraber@energy.state.ca.us	Commissioner Pernell's Office
agarcia@energy.state.ca.us	Al Garcia, Commissioner's Adviser
pao@energy.state.ca.us	Roberta Mendonca, Public Adviser
gshean@energy.state.ca.us	Garret Shean, Hearing Officer
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SALTON SEA GEOTHERMAL UNIT 6 POWER PLANT PROJECT
CEC Docket No. 02-AFC-02

ELECTRONIC PROOF OF SERVICE LIST

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tgulesserian@adamsbroadwell.com	Tanya Gulesserian, CURE Attorney

I declare that I transmitted the foregoing document via e-mail to the above named on the date indicated thereby. I declare under penalty of perjury that the foregoing is true and correct.

Paul Kihm

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	)	Docket No. 02-AFC-02
	)	
Application for Certification,	)	**PROOF OF SERVICE**
for the SALTON SEA GEOTHERMAL UNIT 6	)	[Revised November 21, 2002]
POWER PLANT PROJECT	)	
by CE Obsidian Energy LLC	)	
	)	

I, Bernard Raemy, declare that on December 23, 2002, I distributed a copy of the attached:

APPLICANT'S RESPONSES TO CALIFORNIA UNIONS FOR RELIABLE ENERGY DATA REQUESTS, SET ONE (NOS. 1 – 98)

☒ by depositing a copy with FedEx overnight mail delivery service at Calipatria, California with delivery fees thereon fully prepaid and addressed to the following:

DOCKET UNIT

CALIFORNIA ENERGY COMMISSION
DOCKET UNIT, MS-4
Attn: Docket No. 02-AFC-02
1516 Ninth Street, MS-4
Sacramento, California 95814-5512
Email: docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.

B. Rae

Bernard Raemy

CEC NO. 02-AFC-02
SALTON SEA GEOTHERMAL UNIT 6
POWER PLANT PROJECT

RESPONSES TO:
CALIFORNIA UNIONS FOR RELIABLE ENERGY DATA REQUESTS, SET ONE (NOS. 1 - 98)

Application for Certification (02-AFC-02) for Salton Sea Geothermal Unit 6 Power Plant Project

Submitted by:
CE OBSIDIAN ENERGY LLC

Submitted to:
California Energy Commission
1516 Ninth Street, MS-4
Sacramento, California 95814-5512

File date:
December 23, 2002

Salton Sea Unit #6 Project (02-AFC-02)
Responses to CURE Data Requests, Set One (Nos. 1 - 98)

Table of Contents

GENERAL OBJECTIONS AND QUALIFICATIONS

1. The following responses to data requests are made solely for the purpose of the application before the California Energy Commission.

2. Each response is subject to all appropriate objections, including, without limitation, objections concerning relevancy and materiality. All such objections and grounds for objection involving or relating to the matters raised herein are reserved and may be introduced at the time of hearing.

3. Applicant objects to each and every data request to the extent that it calls for the disclosure of information protected by the attorney client privilege, attorney work product doctrine, or other applicable privilege. To the extent that an individual data request may be construed as seeking such privileged information, Applicant claims such privilege and invokes such protection.

4. Applicant qualifies the responses to data requests by noting that it has not completed its investigation. To the extent that Applicant's future investigation may disclose the existence of additional responsive information, Applicant's responses are made without prejudice to its rights to utilize, produce or introduce at hearing information or documentation which is inadvertently omitted, not yet known, or not yet ascertained, discovered, identified or located by Applicant in responding to the data requests. Without obligation, Applicant hereby reserves the right to supplement, amend or modify the data request responses contained herein.

5. Applicant objects to each and every data request to the extent that it calls for information that is not reasonably relevant to the proceeding or decision. Furthermore, Applicant objects to each and every data request to the extent it calls for information that is readily available and can otherwise be obtained.

6. The foregoing objections and qualifications apply to each and every data request herein, and are incorporated by reference to the extent applicable in each of the specific responses set forth below as though fully set forth therein. The failure to mention one of the foregoing objections in any of the specific responses set forth below shall not be deemed a waiver of such objection.

Air Quality

1. Please revise the fugitive dust erosion emissions in Table G-1 to use an emission factor of 0.11 ton/acre-month or to include additional emissions from on-site and off-site cut and fill.

   Response:

   Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

   The MRI Report provides four levels of analysis for estimating fugitive dust emissions. A level 1 analysis using the 0.11 ton/acre emission factor is not appropriate for the Project because the area and amount of earthmoving is known. A level 2 MRI fugitive dust analysis appropriate for the SSU6 Project is summarized as follows:
   Part 1 - 80 acres * 0.011 tons/acre-month = 0.88 tons/month
   0.88 tons/month * 0.2 (80% control) = 0.176 tons/month
   = 0.277 gm/sec

   (Based on 20 days/month and 8 hours/day work schedule)

   The general area of the site where earthmoving activities occur which could cause fugitive dust emissions is 80 acres. Activities that occur outside the 80 acres including construction of well pads, pipelines, etc. include minimal earthmoving activities with no cut/fill activities proposed, therefore, the MRI erosion emission factor of 0.011 lbs/acre-month does not apply to these activities.

   An 80% control efficiency is being applied to the emission factors due to the mitigation measures that will be enforced on the Applicant during the construction period. The fugitive dust mitigation plan was described in detailed in Section 5.1.4 of the AFC. Also refer to Cure Data Response 4 for additional information.

   Part 2

   Total onsite cut/fill = 105,000 cubic yards (AFC section 5.3.2.1.1).
   105,000 cubic yards * 0.059 tons/1,000 cubic yards = 6.20 tons uncontrolled
   6.20 tons/6 months * 0.2 (80% control) = 1.24 tons controlled

   Total offsite cut only = 62,000 cubic yards (AFC section 5.3.2.1.1)
   62,000 cubic yards * (0.22 tons/1,000 cubic yards) = 13.64 tons uncontrolled
   6.82 tons/6 months * 0.2 (80% control) = 2.73 tons controlled

   This activity occurs for 6 months, refer to Table 3.4.2

   Total from all cut and fill activities = 3.97 tons/6 months
   = 0.66 tons/month

= 1.04 gm/sec

(Based on 20 days/month and 8 hours/day work schedule)

MRI Level 2 analysis total (Part 1 plus Part 2) = 1.32 gm/sec

2. If, in response to Data Request # 1, you revise Table G-1 to include on-site and off-site cut/fill, please provide the volume of cut and fill assumed in your calculations and support your estimate with a grading plan.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The cut/fill volumes were provided in the AFC Section 5.3 on page 5.3-9. Refer to Figure 3.3-11 of the AFC for a copy of the grading plan. Support for the volumes of cut and fill is attached as Attachment CDR-2.

3. Please identify all mitigation measures that will be implemented to achieve an overall 80% fugitive dust control efficiency.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

An extensive list of fugitive dust mitigation measures proposed for the project was described in AFC Section 5.1.4 on pages 5.1-45 through 5.1-47. Also the Imperial County Air Pollution Control District (APCD) has adopted Rule 800, Fugitive Dust Requirements for Control of Fine Particulate Matter (PM-10). This rule is incorporated into the AFC located in Section 5.1.4 and, along with the proposed mitigation measures, will be enforced during the construction period. Achievement of an 80% control efficiency is explained in detail in CURE Data Response 4.

4. Please support the assumed 80% control efficiency with vendor information and/or engineering calculations. If your answer to Data Request # 3 includes watering for dust control, as currently claimed in the AFC on page 5.1-45, please estimate the average annual and maximum daily amount of water that will be required to achieve an 80% control efficiency, using a method such as that in Cowherd et al. (1988).2 Your answer should include a fully documented engineering calculation that identifies all assumptions, including the water application rate, application frequency, capacity of water trucks, and assumed precipitation and evaporation rates.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Particulate Emission Measurements from Controlled Construction Activities (G.E.

Muleski & C. Cowherd, 2001) summarizes a series of field tests on the effectiveness of one control measure (watering) for sources of fugitive particulate emissions found on construction sites. According to the test results, to achieve an average control efficiency of 80% from watering it would be necessary to dispense anywhere between 0.14 and 1.01 gal/yd^2 of water every 4 hours on exposed soil locations at the site. The mitigation plan in the AFC included watering twice daily, which is every 4 hours based on an 8-hour construction workday. The 80% control efficiency used in the Level 2 MRI fugitive dust analysis performed in Response to CURE DR1 including wind erosion was not calculated on watering alone. The 80% control efficiency is a combination of all mitigation measures listed in Section 5.1.4 of the AFC, which are taken from Rule 800 adopted by the APCD.

In essence, the use of a control efficiency of 80% is conservative and the application of the multiple mitigation measures that may be enforced to control fugitive dust emissions during construction will yield control efficiencies greater than 80%.

A control efficiency of 80% used to determine mud/dirt track out emissions is also conservative based on the mitigation measures presented in Section 5.1.4.1.4 of the AFC. Tire cleaning will be performed on all vehicles entering public roadways and the control efficiency for this activity can be greater than 90% control efficiency, i.e., removing more than 90% of the dirt from the tires. Along with the other mitigation measures listed in Section 5.1.4 of the AFC, applying an 80% control efficiency when determining mud/dirt carry out emissions is, therefore, conservative.

With regard to water consumption, the actual use will depend upon the activities conducted. Water use is expected to peak during the earth moving activities and decrease substantially as construction is being completed. The 2,500 gallons per day is an average daily use number, not a maximum. A potential peak usage period would be during the cut of the entire site. Based on the latest reference listed above, water consumption could range from 59,249 to 427,440 gallons for that period. Averaged over the twenty-month construction period this peak usage averages 148 to 1,069 gallons per day. Thus, the 2,500 gallons per day estimate of water consumption is reasonable.

5. Please estimate fugitive emissions from each of the following sources: wind erosion, stockpiles, drop emissions, and mud/dirt carryout, or explain why they are excluded.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Fugitive dust emitted from stockpiles and drop emissions are included in the general erosion emission factor equations contained within the Level 2 fugitive dust analysis.

The Level 2 analysis represents all on-site fugitive dust emissions except wind erosion and mud/dirt carry out, which had been added to the Level 2 analysis that was performed in the response to CURE Data Request 1. Wind erosion and carry out/track out emissions are detailed in Tables R-1 and R-2, respectively. Tables R-1 and R-2 are attached as Attachment CDR-5.

The MRI Level 2 analysis generates an emission rate of 1.32 gm/sec based upon an 8 hour day and 20 workdays per month. With the addition of wind erosion and carry out/track out emissions, the maximum PM10 that will be emitted during construction will be 1.50 gm/sec.

The maximum PM10 emission rate from construction activities is presented in Table G.1-6 of the AFC is 1.45 gm/sec. When this value is compared to the results of the MRI Level 2 analysis (1.50 gm/sec), the values are nearly equivalent for short-term periods. The AFC analysis is confirmed by the MRI methodology.

6. Please provide a copy of the Caterpillar emission guarantee for this engine.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

There is no emission guarantee for these engines. Refer to response to CURE DR 9.

7. Does the applicant propose to use drill rigs equipped only with these low-emission Caterpillar engines?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

No.

8. If the answer to Data Request # 7 is yes, is the applicant willing to accept a COC requiring only Caterpillar 3214DITTA engines that met the emission factors assumed in Table G-2?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
Not applicable.

9. If the answer to Data Request # 8 is no, please (a) provide all justification for your answer and (b) revise the emission calculations in Table G-2 and the dispersion modeling in Tables 5.138 through 5.1-84 to use the emission factors in AP-42, Table 3.4-1.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
The factors used in deriving the emissions from well drilling are based upon manufacturer's data sheets and confirmed with actual stack emission tests of equipment that is routinely used for drilling in Imperial County. These engines are currently permitted at these emissions factors. Second, the Applicant will hire independent contractors that have already obtained the necessary permits for well drilling in Imperial County. Third, the well field development is under the jurisdiction of the Department of Oil, Gas and Geothermal Resources and the permit conditions regarding air emissions from portable engines are anticipated to be developed by the Imperial County Air Pollution Control District or from CARB, depending on whether the contractor pursues a statewide or local permit. Fourth, the use of AP-42 emission factors is not the preferred reference when actual and/or more representative emission test results are available. As stated in AP-42 "Data from source-specific emission tests or continuous emission monitors are usually preferred for estimating a source's emissions those data provide the best representation of the tested source's emissions."
AP-42. Volume I, Fifth Edition—January 1995.

10. Please provide all vendor information that supports the stack diameter and exhaust gas flow rate.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Stack diameter was obtained through information provided by a licensed well drilling contractor who has drilled wells in Imperial County.

As noted in Table G-2, the exhaust flow rate was based upon manufacturer's data for a fire pump engine that provided a reasonable assessment of the exhaust flow characteristics. A copy of the data page is attached as Attachment CDR-10.

11. Exhaust stacks on drill rigs are commonly horizontal. If vertical, they are equipped with a rain cap. The net result is a low exit velocity and very little plume rise. Please provide all information you have on the rigs that will be used that supports a 14 foot high vertical stack with plume rise, as assumed in the dispersion modeling.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
Stack height and stack cap information was based upon discussions with a well drilling contractor. Stack is vertical with no cap. Standard practice is to remove the stack cap when an engine is placed in operation.

12. If the stack in Data Request # 11 is vertical, will it be equipped with a rain cap?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
Please see response to CURE Data Request 11.

13. If the answer to Data Request # 12 is yes, please explain how the cap was simulated in the dispersion modeling.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
Please see response to CURE Data Request 11.

14. Will the applicant be willing to accept a COC that requires the use of drill rigs equipped with four 450-hp engines, each with a 14-foot high, 8-inch diameter stack and exhausting at the rate and under the conditions assumed in the dispersion modelling?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
No.

15. If the answer to Data Request # 14 is no, please (a) provide all justification and (b) revise the modeling to use engine characteristics consistent with those that will be actually used.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
Please see response to CURE Data Request 9.

16. Please resolve the apparent discrepancy between the emissions in Table G-2 and the description of well drilling at pages 3-37 and 5.112.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
The hourly emission rate is based upon 100% load. Drilling a well does not require the engines to be at 100% load all the time, so the best measure of representative longer-term emissions is total fuel use in drilling a typical well. Based on contractor's data for geothermal wells in the Salton Sea area, a typical fuel use rate is 44.3% of the full load or use. This is the value used in deriving the annual emissions of a well and accounts for the difference CURE noted. Using 25.97 lbs per hr NOx*24 hr per day*61 days per well/2000 lbs per ton*0.443 equals 8.4 tons of NOx per well. All this information is listed in Table G-2. The use of a load factor, i.e. fuel usage for

engines, is standard practice in calculating longer-term emissions.

17. Please clarify whether these emissions are for on-site vehicles.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
The emissions listed in Table G-3 include on-site emissions. The emissions listed in Tables G-3.6 and G-3.8 included on and off-site emissions.

18. Please (a) revise the emission calculations to use the most recent version of EMFAC, or (b) justify the use of an outdated model.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
The preparation of the air quality analysis section of the AFC began in early 2001. At that time, the most recent Version of the EMFAC emission factor model was EMFAC2000 Version 2.02. According to Archana Agrawal and H.N. Shamasundara of the California Air Resources Board (CARB) (Agrawal, 2002) confirmed that EMFAC2000 Version 2.02 was the recommended model to use for on-road vehicle emission factor guidance.
The most recent version of EMFAC (EMFAC2002 Version 2.2) does not estimate higher emission factors than used in the G-3 Tables. Version 2.2 has been run with the exact parameters as were used in the analysis contained in the AFC. The model run is attached as Attachment CDR-18. Only emission factors from Classes 1, 2, 7 and 8 were used in the analysis. The emissions factors attached (from EMFAC2002 Version 2.2) are either the same or lower, sometimes up to 50% lower than the emission factors used in the AFC by the Applicant.
Emission factors from the EMFAC2000 Version 2.02 were higher than the EMFAC2002 Version 2.2 run, therefore, the analysis completed by the applicant in the AFC is a more conservative analysis and no revisions are necessary.
Additionally, these emission factor estimation models were run with the understanding that construction would begin in 2002. Construction is now likely to begin in 2003. With the introduction of the new 2003 fleet of vehicles into the EMFAC model, emission factors are likely to decrease even more.

19. For the car, pickup truck, dump truck, fuel truck, water truck and flatbed truck, please disclose the assumptions that were used in running EMFAC2000:

(a) Identify the type of vehicle (LDA, LDTI, LDT2, MDV, LHD1, LHD2, MHD, etc.);

(b) Identify the controls (cat, noncat) assumed for each type of vehicle;

(c) Identify the specific conditions and vehicles speed that you assumed for each vehicle and vehicle type; and

(d) Justify each of your choices in subparts (a) - (c).

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Emission factors used for cars were based on Class 1 (LDA) vehicle totals–i.e., all non-catalytic, catalytic and diesel vehicles that were used in the EMFAC model for this class. Emission factors for pickup trucks were based on Class 2 (LDT1) vehicle totals. Emission factors for the dump truck, fuel truck, flatbed truck and water truck were based on Class 7 (MHDT) diesel vehicles only. Emission factors for the delivery trucks were based on Class 8 (HHDT) diesel vehicles only. These were the only four vehicle categories used in the analysis.

The EMFAC model was run with Salton Sea Air Basin Geographic parameters up to the year 2002. These are the only input parameters that are necessary to provide a gm/sec emission rate for the analysis. Input parameters such as vehicle speed and vehicle type are not needed to run the model.

20. The construction vehicle emission calculations assume 11.5 miles per day for cars and pickup trucks, 20 mi/day for the water truck, and 2.5 mi/day for other vehicles. These estimates appear to be low, given the size of the site. Thus, please explain the basis, justify these choices, and identify whether these are round trip miles.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The mileages listed are estimates of travel based on distances at the projected site.

Car/Pickups 4 round trips at site @ 0.56 miles = 4.5 miles

1 visit to all well pads @ 7.0 miles (round trip) = 7 miles Total = 11.5 miles

Water Truck 5 round trips at site@ 0.56 miles = 5.6 miles

2 visits to all well pads @ 7.0 miles = 14 miles Total = 20 miles

Trucks 2 round trips at site @ 0.56 miles = 2.5 miles Total = 2.5 miles

21. Note 5 to Table G-3 indicates that mileage is based on estimated "on site travel distances." Please confirm that these vehicles would remain on-site throughout the duration of construction. If not, please clarify whether off-site travel distances are included in these estimates or elsewhere.

Response:

Subject to the above-referenced General Objections and Qualifications, and without

waiving the same, Applicant responds:

The mileage listed in Table G-3 is based upon on site travel. The mileage listed in Tables G-3.6 and G-3.8 includes on and off-site travel.

22. The vehicle (cars, trucks) emission rates in lb/hr in Table G-3 appear to be lb/day, rather than lb/hr. Please verify the units and revise as appropriate.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The units for the vehicle emissions are lbs/day. Tables G-3, G-3.1, G-3.2, G-3.3, G-3.4, G-3.5 would all have this change.

23. The number of pieces of equipment assumed in the monthly vehicle emissions in Table G-3.1 are inconsistent with the construction equipment usage reported in Table 3.4-2. Please (a) explain the inconsistency and (b) revise these emissions as appropriate.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Table 3.4-2 lists the equipment anticipated for the construction of the power plant and pipelines. It does not contain the equipment anticipated for the construction of the transmission line. Tables G-3.1 through 3.5 contain the emissions of the power plant, pipelines and transmission line. No revision is necessary.

24. Emission factors for on-road trucks are used for the dump trucks. Normally, dump trucks are off-road vehicles and off-road emission factors are used due to differences in duty cycles. Please provide all justification for using on-road emission factors for the dump trucks.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The dump truck was most appropriately characterized as a Class 7(MHDT) diesel vehicle category for analysis with the EMFAC2002 model. There is no justification to exclude it from this vehicle category.

25. Please provide an estimate of evaporative and refueling emissions and support your estimate with references and engineering calculations.

Response:

Subject to the above-referenced General Objections and Qualifications, and without

waiving the same, Applicant responds:

There are no evaporative or refueling emissions from diesel fuel. Table G-3 shows that all off-road construction equipment will be diesel fired. All vehicles run with gasoline have been analyzed using emission factors from the EMFAC model, which includes all evaporative emissions in the total VOC emissions that were used to calculate VOC emissions from gasoline fired vehicles.

26. Please provide all justification for using emission factors that are lower than those recommended by the SCAQMD CEQA Handbook that was relied on, or revise the off-road construction emissions to use the correct factors.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Table A9-8-A is based upon AP-42 Report, September 1985. EPA has conducted several studies of these off-road emission factors and the September 1985 data is no longer available as a recommended resource. As such, utilization of Table A9-8-B is more appropriate.

27. Please provide all justification for using these average values, or revise the off-road emissions to use the ratings of equipment that will actually be used.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The applicant believes that the SCAQMD CEQA Handbook, Table A9-8-C is applicable to this project.

28. Please provide all justification for using lower PM10 emission factors than recommended in the U.S. EPA Nonroad Engine and Vehicle Emission Study (11/91).

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The Applicant believes the SCAQMD CEQA Handbook is a valid and appropriate document applicable to this project due to the state-specific factors considered in the referenced document. The EPA study fails to take into account these state-specific variables and covers the entire nation.

29. If the lower PM10 emission factors assume the use of CARB diesel, is the applicant willing to accept the use of only CARB diesel as a COC?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

No. CARB diesel (i.e., less than 500 ppm sulfur) is the only available diesel in California for mobile equipment. The average sulfur content in diesel fuel sold in California is 141 ppm. Information regarding sulfur content in diesel fuel available in California can be found in Fuels Report: Appendix to the Diesel Reduction Plan (Appendix 4) prepared by CARB. [CARB, 2000, Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles, CARB, Stationary Source Division, October 2000]

30. Please provide all engineering calculations you relied on that support these factors.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The usage factors shown in Table 3.4-2 and Table G-3 represent an assessment based on past experience on similar types of projects.

31. Many types of trucks not included in the equipment inventory in Table 3.4-2 would be required daily to construct the transmission line, including concrete (for footings) delivery trucks, pole delivery trucks, cable/conductor delivery trucks, bucket trucks, drum puller trucks, dual tensioner trucks, and pickup trucks. Further, two cranes working in tandem are required to install a transmission line, a 2-4 ton, 425-hp crane and a 20-ton, 425-hp crane. Some of this equipment is shown on Figure 3.4-1. The AFC does not appear to have included all of the transmission line construction emissions. Please (a) identify all of the equipment that will be used to construct the transmission lines and (b) revise the emission inventory to include this additional equipment.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Table 3.4-2 contains the equipment necessary for the construction of the power plant and pipelines. It does not contain the list of equipment for the transmission line construction. The list of equipment anticipated for the transmission line construction was included in the emission inventory. Refer to the response to CURE DR 23. The list of equipment includes: pickup trucks, fuel truck, flatbed trucks, dozer, trencher/backhoes, crane-45T, and compressors.

32. Typical pipeline construction activities include hauling and stringing of the pipe along the route; welding, radiographic inspection and coating of the pipe welds;

installing pipe supports; raising the pipe into the aboveground rack; hydrostatic testing of the pipeline; and cleanup and restoration. These activities would require the following additional equipment: pipe-stringing trucks to transport pipe from the shipment point or storage yard to the pipeline ROW, bending machines to conform the pipe to the terrain, welding trucks and rigs to weld the pipe, side-boom tractors to lift the pipe into the racks, and numerous support equipment including an A-frame truck, coating truck, mechanics rig, a parts van, and x-ray trucks, among others. Thus, the AFC apparently did not include all of the pipeline construction emissions. Please (a) identify all of the equipment that will be used to construct the pipeline and (b) revise the emission inventory to include this additional equipment.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

(a) Equipment required to construct the pipeline is included in Table 3.4-2.

(b) As noted in (a) the list of equipment is already included in Table 3.4-2 and thus is already part of the emission inventory.

33. Implementing the geotechnical recommendations to accommodate the expansive, weak, liquefable soils found throughout the site, would likely require the import of clean fill, limestone, and other materials that do not appear to be included in the truck estimates. Please (a) identify the equipment that will be used to implement your geotechnical recommendations and (b) revise the emission inventory to include any additional trucks and other material required to implement the recommendations of the geotechnical report.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
(a) Equipment required to implement the geotechnical recommendations is included in Table 3.4-2. (b) As noted in (a), the list of equipment is included in Table 3.4-2 and thus is already part of the emission inventory.

34. The AFC includes idling emissions for only PM10 from delivery trucks in Table G-3.6, but not for any other construction equipment. (AFC, Appx. G.) Idling emissions were not estimated for other pollutants or any off-road heavy equipment, e.g., scrapers, dozers, even though significant idling occurs during construction as evidenced by the low use factors. Idling emissions can be estimated using factors published by the EPA,7 those measured in the Colorado study, or estimated by the MOBILE5b and PART 5 models.

(a) Please revise the construction emission inventory to include idling emissions for all on-site and off-site construction equipment.

(b) Please provide the PM10 idling emission factor used for delivery trucks in Table G-3.6 and identify its source.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

(a) The Applicant has made a commitment to limit the idling of construction equipment to a maximum of five minutes to the extent feasible. Idle emissions are substantially less than normal operating emissions and further limiting the idling to five minutes will make the idling emissions negligible relative to normal operations. Also, idle emission rates predicted by EMFAC2000 are included with the total emission factors for each vehicle category. Therefore, idle emissions need not be separately included and there is no need to revise the construction emission inventory, although for PM10 the emission rate would marginally decrease. (b) Refer to discussion in (a) above.

35. Heavy equipment and machinery would be transported by rail whenever possible and cost effective. (AFC, p. 5.10-7.) Locomotive emissions are generally much higher than equivalent emissions from on-road vehicles due to differences in fuel composition and duty cycles, among others. The construction emission inventory does not contain any rail transport emissions. Please (a) identify all equipment or machinery that would be delivered by rail; (b) the number of rail trips that will be used (i) for delivery of all equipment and (ii) for other construction and operational needs of the project; and (c) revise the construction emission inventory to include rail emissions.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

(a) No determination has been made as to what equipment, if any, would be transported by rail, since there are no rail spurs that access the site. All equipment proposed for the project has been included in the truck deliveries.

(b) Please refer to (a) above.

(c) Please refer to (a) above. All anticipated emissions due to the delivery of equipment have been included in the emission inventory.

36. Please provide the emission factors used to estimate well flow run emissions and any supporting data, including source tests and brine and steam composition data assumed in the emission calculations.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Emissions Factors (for PM10):

Production Test Unit = (0.001) (0.259) (0.3126) = 8.100 x 10-5

[1,200,000 x 8.100 x 10-5 = 97.2 lb/hr]

Injection Test Unit = (.001) (0.181) (0.2828) = 5.114 x 10-5

[1,000,000 x 5.114 x 10-5 = 51.1 lb/hr]

Note: Emission Factors were not used to determine emissions. Case specific calculations were made instead (see CURE DR37 and 39).

37. Please provide a sample calculation for PM10 for the column captioned "production single well (lbs/hr).

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Well Flow = 1,200,000 lb/hr

Flash – 0.259

Steam Flow = (0.259) (1,200,000) = 310,920 lb/hr

Brine Flow = 1,200,000 – 310,920 = 889,080 lb/hr

Well TDS = 231,606 mg/l

Brine TDS = (231,606 mg/l) (1,200,000) / (889,080) = 312,602 mg/l

Carryover Fraction = 0.001 (0.1%)

Brine Carryover = (0.001) (310,920) = 310.92 lb/hr

Solute Carryover = (310.92) (0.312602) = 97.2 lb/hr

38. Please provide a sample calculation for PM10 for the column captioned "production multiple wells (lbs/period).

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

96.8 lbs/hr*232 hr/period = 22458 lbs/period.

The hourly rate is a calculated number. Refer to CURE Data Request Response No. 37.

39. Please provide a sample calculation for PM10 for the column captioned "injection single well (lbs/hr).

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Well Flow = 1,000,000 lb/hr

Flash = 0.181

Steam Flow = (0.181) (1,000,000) = 180,881 lb/hr

Brine Flow = 1,000,000 – 180,881 = 819,119

Well TDS = 231,606 mg/l

Brine TDS = (231,606 mg/l) (1,000,000) / (819,119) = 282,750 mg/l

Carryover Fraction = 0.001 (0.1%)

Brine Carryover = (0.001) (180,881) = 180.9 lb/hr

Solute Carryover = (180.9) (0.2828) = 51.1 lb/hr

40. Please provide a sample calculation for PM10 for the column captioned "injection multiple wells (lbs/period).

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

There was a nonmaterial error in Table G-14. Refer to CEC Data Request Response No. 100.

56.3 lbs/hr*54 hr/period = 3041 lbs/period

The hourly rate is a calculated number. Refer to CURE Data Request Response No. 39.

41. The well flow emissions are based on 286 hours per year of uncontrolled venting,

consisting of 54 hours for redrilling injection wells, 48 hours for redrilling production wells, 40 hours for warm starts, and 144 hours for coil tube cleanout. (AFC, p. 5.1-19.)

a) Do these estimates include unscheduled outages? Please support your answer with outage data for the Salton Sea Units 1 through 5 over the past 5 years.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The estimates listed do not include unscheduled outages. No emission are expected at the injection wells during outages and emissions from the production wells outages occur at the SSU6 vent tanks. Refer to CURE DR 42(c) Response. The estimate is based upon engineering and process judgment. As noted previously, no outage data for Units 1 through 5 will be provided.

(b) Do these estimates include redrilling of the plant and condensate wells? (AFC, p. 5.1-18.)

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Yes.

42. Turning a geothermal well on or off is a major operation and risks damaging the wellbore and surface equipment. Thus, there is a strong incentive not to interrupt steam production during outages.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The introductory statement regarding well operations is incorrect and unsubstantiated.

a) Will the production wells be shut in during all outages?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

No.

b) If the answer to subpart (a) is no, under what types of outage conditions would they

continue to produce?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Any short-term outage e.g. turbine trip.

c) If the answer to subpart (a) is no, please revise the well flow emissions in Table G-14 to include these emissions.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Emissions from outages are included in Table G-15 Vent Tank Emissions. There is no need to revise the emissions estimates as requested.

d) If the answer to subpart (a) is yes, is the applicant willing to accept a COC that would prohibit steam venting during outages?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Not Applicable, please see response to (a) above.

e) If the applicant is not willing to accept a COC that would prohibit steam venting during outages, as requested in subpart (d) please (i) explain your reasons and (ii) provide all justification?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Not Applicable, please see response to (c) above.

43. Please provide an estimate for these emissions, or provide all evidence you have to explain why they are excluded.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

These emissions are expected to be negligible.

44. Please provide chemical composition data for the following emission streams. The data should include criteria and toxic pollutants, as well as carbon dioxide.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

a) Noncondensible gases that follow the flashing steam (AFC, p. 5.1-14)

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please see Attachment CDR-44.

b) Noncondensible gases that partition to the condensate (AFC, p. 5.1-5)

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please refer to response (a) above.

c) Cooling tower circulating water. Please include the contribution from chemicals added to control scale and biological growth.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please refer to response (a) above.

45. Please explain how the composition data in Data Request # 45, subparts (a) to (c) was determined. If by engineering calculation, please provide a copy of all supporting data and a sample calculation. If from test data, please provide a copy of the test data.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please refer to CEC Data Request Response 54 and 55.

46. Please expand the emission inventory and modeling analysis to include the following additional analyses:

(a) Emissions and ambient air concentrations for SO4. Please include the conversion of H2S to SO4 in your calculations.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

(a) The emissions of sulfate from SSU6 are as follows:

Cooling Tower 2.02 lbs/hr

Dilution Water Heaters 0.00 lbs/hr

Silica Filter Cake 0.00 lbs/hr

Sulfur Filter Cake 0.00 lbs/hr

The ambient sulfate concentrations measured at the Brawley – Main Street Monitoring Station are provided in the following table. The table includes 24-hour maximum and annual average ambient sulfate concentrations from 1990 to 1999.

Ambient Sulfate (SO4) Levels at Brawley - Main Street

Brawley - Main Street, Imperial County Location = 2415, AIRS_ID = 060250003	***1990***	***1991***	***1992***	***1993***	***1994***	***1995***	***1996***	***1997***	***1998***	***1999***
Maximum 24-Hour Concentration (ug/m3)	4.9	4.6	6.2	5.1	5	5.4	5.7	4.4	4.7	NA
Number of Days Exceeding California 24-Hour Standard (25 ug/m3)	0	0	0	0	0	0	0	0	0	NA
Annual Average Concentration (ug/m3)	2.45	2.72	2.43	2.24	2.45	2.28	2.26	2.05	2.01	NA

CARB - California Ambient Air Quality Data CD's (1980-1999)

Any conversion assumptions of H2S to SO4 for the SSU6 Project are speculative; there are no accepted conversion rates for H2S to SO4.

(b) Emissions and ambient air concentrations for PM2.5

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The proposed ambient standards for PM2.5 are not final; therefore, emissions and ambient concentrations are not necessary in that there is no ambient standard currently in place.

(c) Revised PM10 air quality impact analysis based on the recently revised California 24-hour PM10 AAQS

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

As noted in (b) above the proposed ambient standards are not yet final, therefore no revisions are required.

(d) Cumulative air quality analysis that includes all existing facilities.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

A cumulative air quality analysis was performed in accordance with CEC/ICAPCD protocols. Refer to AFC Section 5.1 .3.

47. Please provide a reference and all data that supports a 24.6 ug/m3 background H2S level.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The background H2S level was established by information provided by Mr. Harry Dillon of the Imperial County Air Pollution Control District.

48. Please provide at least 1 year of recent ambient H2S monitoring data from all H2S monitors at the existing geothermal facilities.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

There is no ambient H2S monitoring data from the existing geothermal facilities available.

49. Please respond to the following questions regarding the conversion pathways:

(a) The AFC, p. 5.1-44, claims that only 10% to 30% of the NOx is converted to nitrate based on "studies." Please identify all "studies" that support the range of 10% to 30%, and if not publicly available, provide copies.

(b) The AFC, p. 5.1-44, calculates the contribution of ammonia to secondary PM10 by using only the lower end of the range of 10% to 30% noted in subpart (a), because "the area is not considered a polluted environment."

i. Please clarify what you mean by "a polluted environment" and provide the

chemical pathway that would be affected. Support your answer with any references to the literature or other evidence that you rely on.

ii. Please justify using only the lower end of the range of 10% to 30% for NOx to N03 conversion (10%) by citing any references to the literature or other evidence that you rely on and provide atmospheric composition data, e.g., OH, 03 to justify your choice.

(c) Nitric acid vapor reacts reversibly with ammonia to form NH4NO3 particles.8 This reaction was not considered in the secondary PM10 calculations in the AFC. Please revise the secondary PM10 calculations at page 5.1-44 to include the direct reaction of nitric acid vapor with ammonia or provide any evidence you rely on that shows that the reaction does not occur.

d) The brine contains very high concentrations of NaCl, some of which will be emitted from the cooling tower and elsewhere. The emitted NaCl can react with HN03 in the plume and downwind in the atmosphere, forming nitrate, viz., HN03 +NaCl->NaNO3 + HCl.9 Please revise the secondary PM10 calculations at page 5.1-44 to include the reaction of nitric acid vapor with NaC1 or provide any evidence you rely on that shows that the reaction does not occur.

(e) The project would emit SO2. Most of this SO2 would be converted to sulfate, which could react with ammonia to form ammonia sulfate. Please revise the secondary PM10 calculations at page 5.1-44 to include this PM10 formation mechanism or provide any evidence you rely on that shows that the reaction does not occur.

(f) The project would emit H2S, which would ultimately be converted to SO2 and sulfate,'° reacting with ammonia to form ammonia sulfate. Please revise the secondary PM10 calculations at page 5.1-44 to include this PM10 formation mechanism or provide any evidence you rely on that shows that the reaction does not occur.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

(a) Please refer to CEC Data Request Response 3.

(b) Please refer to CEC Data Request Response 3.

The local area of the project has minimal sources of an industrial or urban nature (NOx /Ozone).

(c) Please refer to CEC Data Request Response 2.

(d) Refer to CEC Data Request Response No. 2 (docketed on December 2, 2002).

(e) The emissions of SO2 from the project are less that 0.5 tons per year. Any secondary PM10 formation would be insignificant. Refer to AFC Section 5.1.2.7.3, Secondary Pollutant Impacts.

(f) Any conversion assumptions of H2S to PM10 for the SSU6 project are speculative; there are no accepted conversion rates for H2S to PM 10.

50. Please explain the basis of the 10.0 ppb choice and provide chemical measurements, references to the literature, and any other evidence you have to support this value.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The formation of particulate nitrate is dependent on the ambient concentration of ammonia, which preferentially reacts with sulfate. The ambient ammonia concentration is input into CALPUFF as a domain averaged number. The modeling domain extended outwards of 177 kilometers from the project site. Based on a review of available data, Langford et al. (1992)1 suggest that typical background ammonia values are 10 ppb for grasslands, 0.5 ppb for forests, and 1 ppb for arid lands. Ammonia can show strong dependence with ambient temperature and strong dependence on the soil pH. Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary report2 recommends the background level mentioned earlier. Since the project site will be a source of ammonia, assigning the highest typical background value of 10 ppb throughout the entire modeling domain of 177 kilometers will ensure the conservative nature of the analysis.

51. The project would emit very large amounts of ammonia. Do the visibility calculations include the contribution of the Project's ammonia emissions to the background ammonia value of 10.0 ppb?

Response:

[1] LANGFORD et al., 1992. Langford, A.O, F.C. Fehsenfeld, J. Zachariassen, and D.S. Schimel, 1992: Gaseous Ammonia fluxes and Background Concentrations in Terrestrial Exosystems of The United States; Global Biogeochemical Cycles. Vol. 6(4):459-483.
[2] IWAQM, 1998. Interagency Workgroup on Air Quality Modeling (IWAQM), Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts; EPA-454/R-98-019; U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards: Research Triangle Park, NC, December 1998.

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The visibility calculations included the effects of ammonia from the project by the assignment of the highest background ammonia concentration (10 ppb) as recommended by IWAQM.

52. If the answer to Data Request # 52 is no, please explain why not and provide any evidence you have to support your answer.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
See the response to Data Request #51.

53. If the answer to Data Request # 52 is yes, please identify the Project's contribution and explain how it was calculated or supply electronic files that contain the dispersion model runs.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please see responses to CURE Data Requests 50 and 51.

54. Please provide all source test data, including data from the existing Salton Sea Geothermal Units 1 through 5, which support these very high removal efficiencies.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please refer to CEC Data Request Response 55.

55. Please provide the results of pilot plant tests (mentioned on p. 5.1-15) that support the claimed benzene removal efficiency and any of the other claimed removal efficiencies not otherwise supported by representative source test data.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please refer to CEC Data Request Response 55.

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56. The treated gases are routed to the cooling towers, which are quite difficult to

monitor and thus are rarely source tested. How does the applicant propose to demonstrate initial and routine compliance with the removal efficiencies assumed in the emission calculations?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The SSU6 project will demonstrate compliance with applicable permit conditions by testing the inlet and outlet of the proposed LO-CAT and carbon absorber control equipment. This is the normal and routine procedure for assessing removal efficiencies.

57. Please provide an MSDS for each of the additives required continuously to operate the LO-CAT system, as identified on page 3-21 of the AFC.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Attachment CDR-57 presents copies of the MSDS.

58. Please support your conclusion that vented steam is clean and contains no noncondensible gases with a credible physical explanation, engineering calculations, and appropriate measurements.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The vented steam at the Elmore Facility identified in CURE's background discussion is from the remaining pressure of the brine. All the noncondensible gases have already been flashed off with the high and standard pressure steams. Therefore, no noncondensible gases are anticipated from these releases.

However for information purposes an estimate of potential emissions from an equivalent emission source, dilution water heaters, has been made and presented in the AFC. On a brine flow basis Elmore's emissions from the atmospheric flask tank would be less than 21 per cent of the dilution water heater's emissions from SSU6, which would make Elmore's atmospheric flash tank an insignificant source.

59. Are there any other release points for steam? If yes, please identify each such release point, provide chemical composition data, and estimate emissions.

(a) Figure 3.3-9 shows a vent on the Dilution Water Deaerator. Is this the same as the vent observed on the Atmospheric Flash Tank, or is it a separate vent?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

All steam release points for the SSU6 Project have been identified. The dilution water heater vents are the equivalent vents of the Elmore atmospheric flash tank.

(b) Contaminated steam and/or noncondensible gases could be released at pumps, compressors, valves, and flanges throughout the facility, some which are shown on Figs. 3.3-9 to 3.3-10E. Please provide an inventory of fugitive components and emissions there from.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The SSU6 project will have a maintenance program that will minimize any potential releases from pumps, valves and flanges. These types of releases are an insignificant emission source.

60. If no, will the applicant be willing to accept a COC that would prohibit any other release points for steam?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

No. The project will have a maintenance program in place to prevent and minimize these types of releases.

61. Has the applicant monitored, or is the applicant aware of any chemical monitoring data or studies on the vented steam plumes? If yes, please provide copies of all such data and/or studies.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

No. Refer to response to Cure Data Request 58.

Waste Management

62. Please provide the results of a Toxicity Characteristic Leaching Procedure ("TCLP") on a representative sample of filter cake.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please see Attachment CDR-62.

63. Please provide a copy of the Material Safety Data Sheet ("MSDS") on filter cake.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please see Attachment CDR-63.

64. The estimated chemical composition data for filter cake is presented in Table 3.3-6. Please present engineering calculations showing how these values were estimated and identify all underlying assumptions.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The filter cake composition shown in Table 3.3-6 of the AFC was estimated by calculating the mean concentration of each of the analyses from data derived from samples of filter cake from existing power plants. The mean was determined by dividing the sum of replicate measurements by the number of results in the data set. Please see Attachment CDR-63.

65. Wastes like filter cake are generally tested prior to disposal. Please provide filter cake TCLP and solids analyses for the previous 1 year for each of the existing geothermal units in the Salton Sea area.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please see response to CURE Data Request 62.

66. Please summarize the relative amount of filter cake that was disposed as hazardous and nonhazardous waste from each of the existing geothermal units in the Salton Sea area over the past 5 years.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please see AFC page 3-17 and Responses to CURE Data Requests 64 and 68.

67. We understand that historically filter cake from existing geothermal units was used to construct berms and roads in the Salton Sea area. Please provide the following information on these practices:

(a) Were the berms and roads bordering the Salton Sea Unit 6 Project site constructed from filter cake or do they contain any filter cake? Please provide all information supporting your answer.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

It is not known whether any areas bordering the SSU6 project were constructed from filter cake. In further response, the Applicant does not believe this question is relevant to the current project. Any historic utilization of filter cake was done with approval, authorization and/or knowledge of the Regional Water Quality Control Board. In further response, see response to Data Request #67 (c) below.

(b) Please identify all of the landfill(s) historically used to dispose of filter cake from the existing geothermal units in the Salton Sea area.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The SSU6 nonhazardous filter cake will be disposed of at the monofill and hazardous filter cake will be disposed of at a properly licensed Class I facility, consistent with historical practices of the existing facilities.

(c) Please identify all regulatory agencies that are aware of and have investigated the historical filter cake disposal practices from the existing geothermal units in the Salton Sea area.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The Applicant cannot speculate on which agencies are aware of and may have investigated the historical filter cake disposal practices.

68. Please explain the basis of the assumed 95% nonhazardous 5% hazardous split for filter cake. Please support your answer with all engineering calculations, historic data, and chemical composition data and identify all assumptions that you rely on.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The split is based on a review of historic information regarding total filter cake produced on an annual basis, monofill disposal information and hazardous waste disposal manifests. It is anticipated that past results will be consistent with future filter cake production characteristics. Nonetheless, all filter cake will be tested prior to disposal to ensure appropriate disposal. See response to Data Request No. 71(a) below.

69. If the 95%/5% split differs from historic practices, please detail all changes in engineering design, processing and/or disposal that the applicant believes would now allow the production of a 95% nonhazardous filter cake. Please support your answer by pilot plant or other operating data and engineering calculations.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The 95%/5% split does not differ from applicable historic experience in the Salton Sea Known Geothermal Resource Area.

70. The disposal of filter cake would require at least one and perhaps more daily truck trips. These trips are not acknowledged in the traffic and transportation section of the AFC. Filter cake is radioactive and contains high levels of arsenic and other metals. (AFC, Table 3.3-6.) An accident could result in significant public health impacts. Thus, please provide an analysis of the impacts of an accident involving a filter-cake truck, or, alternatively, provide the information required to prepare such an analysis, e.g., number and type of trucks per day, destination, and route.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please refer to CEC Data Request Response 92.

71. During the site visit on November 19, 2002, the applicant indicated that filter cake will be disposed at a "monofill," a landfill owned by the applicant that only accepts filter cake.

(a) Please describe the procedures that will be used at this monofill to dispose of filter cake as a hazardous and a nonhazardous waste.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

As a point of clarification, the monofill will accept only nonhazardous filter cake; no hazardous waste will be disposed of at the monofill. Prior to transport of filter cake material, all filter cake will be tested to ensure that it meets the applicable criteria for disposal at the monofill. If the analytical data obtained from sampling indicates the material is hazardous, it will be transported to a properly licensed Class I hazardous waste disposal facility. If the analytical data supports the characterization of the material as nonhazardous under state, federal, or local regulations and it meets the criteria for disposal at the monofill, it will be placed in end-dump trailers, manifested as nonhazardous waste, and transported to the monofill. Each load of nonhazardous filter cake will be subject to confirmation regarding the tracking and manifest number once it arrives at the monofill. When this information is confirmed, the waste will be accepted at the monofill and the waste will be discharged into the active cell. Each trailer will be checked to ensure it is free of geothermal material prior to leaving the monofill cell.

The monofill is a Class II facility and holds regulatory permits and/or authorizations from the Imperial County Air Pollution Control District, the Imperial County Public Health Services, Division of Environmental Health Services, California Integrated Waste Management Board, Regional Water Quality Control Board, and the Imperial County Planning/Building Department.

72. Will scale deposition occur at Salton Sea 6?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Scale formation on piping and vessels is anticipated to occur at the facility.

73. If the answer to Data Request # 72 is yes, please complete the following:

(a) Estimate the amount and chemical composition of the scale wastes;

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

It is anticipated that approximately 2,500 tons of scale material will be produced annually. The scale material is anticipated to be characterized as hazardous, exhibiting the characteristics set forth in Attachment CDR-73.

(b) Provide evidence to support your estimates of the amount and chemical composition of the scale wastes; and

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The estimate of material produced on an annual basis is calculated from the amount of piping in the facility and other equipment surfaces through which brine flows and scale adheres to. The chemical composition is based upon concentrated constituents found in brine and the average brine flow.

(c) Explain how scale wastes will be removed and handled.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:
Scale material will be removed from piping and vessels by hydroblasting. Hydroblasting is the utilization of high pressure water to remove the scale material. The hydroblasting will be performed in a designated area on concrete pads with concrete side walls to prevent the potential release of scale material to the environment. Once dislodged from the equipment, the scale material will be packaged, labeled and stored in accordance with hazardous waste requirements and transported to a permitted Class I disposal facility.

74. If the answer to Data Request # 72 is no, please complete the following:

(a) Describe the changes in processing that have been implemented to eliminate scale formation; and

(b) Provide all evidence to support your answer in subpart (a).

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please refer to response to CURE Data Request 72.

Water Resources

75. Please provide site-specific value estimates for the potential evaporation (p), average hourly daytime traffic (d), time between watering applications (t), and application intensity (i) for use in the above equation.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please refer to response to CURE Data Request 4.

76. Please provide all information that supports the proposition that 80% dust control can be achieved by applying only 2,500 gallons per day.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please refer to response to CURE Data Request 4.

77. Does the upper limit of 25% include recognition of the gradual increase in brine TDS?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Yes.

78. If the answer to Data Request # 77 is yes, please provide (a) an engineering calculation and (b) all evidence, data and references to literature you have to support your answer.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Historical TDS production trends over a period of 14 years were reviewed for all production wells utilized by the existing power plants. In Region 1, Region 2 and Elmore (plants adjacent to the Unit 6 project area), the TDS trend data from all of the production wells has remained essentially unchanged over the past 14 years. There is no present evidence of injection breakthrough in any of the wells in these three areas – in fact, TDS for some wells even trend downward. In the Leathers region, only 1 well of the group showed any evidence of increasing TDS. The remaining Leathers production wells show flat historical TDS production trends.

Brine dilution water demand for the Elmore and Leathers plants (dilution water is

not required at the Region 1 and Region 2 plants) follow the individual well TDS trends, with dilution water demand data virtually unchanged over the past three years.

The proposed production wells for SSU6 are sited in locations even further from injection wells than any current production well in Regions 1, 2 or 3. This wide separation between injection and production wells further reduces the potential for unexpected or unusually high injection breakthrough returns that could result in increasing production brine TDS.

79. If the answer to Data Request # 77 is no, please (a) estimate the brine salinity at the end of the Project life, assumed to be 20-30 years, due to injection of a concentrated brine stream and (b) provide all justification you have for your estimate.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please see response to CURE data request 77.

80. The Applicant indicated during the November 19, 2002 site visit that brine salinity is routinely analyzed to evaluate brine quality. Thus, if not provided in response to Data Requests # 77 - 79, please provide brine salinity data from at least three nearby existing producing geothermal wells that support an average brine TDS of 23.5% and an upper limit on brine TDS of 25%.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The production wells for the SSU6 project development area encompasses acreage northeast of Region 1, northwest of Region 2 and west of Elmore. TDS data from a total of 24 wells in those three regions have been used to develop an expected average brine salinity of 23.5% and upper limit of 25% for the SSU6 wells. The wells reviewed list include four Region 1 wells, fifteen Region 2 wells and five Elmore wells.

81. Is the applicant aware of any changes in brine quality in the Salton Sea KGRA?

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please see response to CURE Data Request 78.

82. If the answer to Data Request # 81 is yes, please (a) identify the parameters that

have changed and the cause(s) of the changes and (b) provide all data supporting your answer.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please see response to CURE Data Request 78.

83. If the answer to Data Request # 81 is no, please provide all justification that supports the no change conclusion.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please see response to CURE Data Request 81.

84. Please provide all information that supports an annual average consumptive water demand of 5 ac-ft/ac of water for the crops historically grown on lands that would be taken out of agricultural production by the Project. Your response should include IID irrigation water delivery data and annual cropping patterns.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Attachment CDR-84 provides water consumption data at the proposed Project location. These data were provided by the Imperial Irrigation District.

85. Please support the estimate of 173 acres of fallowed land. Your answer should include a land use map that overlays areas that would be disturbed by the Project on lands that are currently and have historically been irrigated with IID water.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please refer to Table 5.3-3 of the AFC.

86. The Agriculture and Soils section of the AFC indicates that only 97 acres would be taken out of production (AFC, p. 5.3-12) while the Water Resources section assumes that 173 acres would be taken out of production. (AFC, p. 5.4-8.) Please reconcile these two estimates.

Response:

Subject to the above-referenced General Objections and Qualifications, and without

waiving the same, Applicant responds:

The Water Resource Section of the AFC indicating 173 acres is correct.

87. Please identify a backup supply if sections 4.1 and 4.3 of the Agreement result in curtailment of the Project's primary supply. Your analysis should include an evaluation of irrigation tail water as a backup supply.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Section 4.1 of the Agreement will not result in curtailment of the water source because the Applicant does not plan on taking water at a rate that will unreasonably deplete the supply available in the canal for other uses. A maximum rate of 3 cubic feet per second per day is indicated in the Agreement and the Applicant expects a maximum rate of 1 to 2 cubic feet per second per day.

Section 4.3 will not result in a curtailment of the water source that would have a potential to impact the Project due to ratio limitation provided under section 4.3.

A backup supply of water is not required. Alternative sources of water were discussed in CEC Data Request Response 80.

88. Please evaluate the impacts of using the backup supply(ies) identified in Data Request # 87.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please see response to CURE Data Request 87.

89. Please provide copies of IID's contracts for Colorado River and any other water that would be supplied to the Project.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The Applicant does not possess the requested contracts referenced here.

90. The Agreement provides up to 1,000 afy of III) water while the AFC's analysis is based on the use of an average of 293 AFC, resulting in net reduction in demand, up to a maximum of 987 afy.

Response:

Subject to the above-referenced General Objections and Qualifications, and without

waiving the same, Applicant responds:

There is no discrepancy as the contract amount of 1,000 afy supports the maximum quantity of 987 afy water consumption

(a) Please resolve the discrepancy between the Agreement (1,000 afy) and the AFC's analysis (avg. 293 afy, max 987 afy).

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The impact evaluation is based on the anticipated water consumption rate of 293 afy.

(b) Please evaluate the impact of using up to 1,000 afy of IID water for cooling and other process uses.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The water will not be used for cooling.

91. The Salton Sea has a history of water quality issues associated with increasing salinity and nutrient concentrations. (AFC, p. 5.4-5.) The Project would use up to 1,000 afy of irrigation water, a portion of which would have flowed into Salton Sea. Therefore, the Project will increase salinity and nutrient concentrations around the shore of the Sea. Please analyze the water quality impacts of removing up to 1,000 afy of water from the Salton Sea.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Total inflow to the Salton Sea from tilewater, tailwater and drains is estimated at 1.5 million-acre feet per year (Cohen et al, 1999). The use of 1,000 acre-feet of water per year from the IID system will have an almost immeasurable effect on the Salton Sea.

[Cohen, M., J. Morrison, and E. Glenn. 1999. Haven or Hazard: The Ecology and Future of the Salton Sea, Pacific Institute for Studies in Development, Environment and Security, Oakland, California]

92. Please provide a copy of the application for a waste discharge permit for SSU6.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

A copy of the Application of Waste Discharge Requirements as filed with the Regional Water Quality Control Board was provided in the Data Adequacy responses filed on September 18, 2002.

93. Please summarize historic releases over the past 5 years from other similar brine ponds at existing units 1 - 5. For each release, please provide the date of the release, the cause of the release, the size of the release, the composition of released fluids, the consequences of the release, actions taken to cleanup the release, and change(s) made in pond design and operation to prevent similar future releases.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

No releases from other similar brine ponds at existing units 1 – 5 have occurred over the past five years. The SSU6 project's brine pond design is not similar to the brine ponds at existing units 1 – 5.

94. Have any design features been incorporated into the SSU6 brine ponds that distinguish them from existing brine ponds? If yes, please identify these features.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

The SSU6 project's brine ponds have been designed to be aboveground structures that meet all design requirements of Title 27. The design includes two ponds, rather than one, to provide redundancy and allow one pond to be taken out of service during the removal of solid material.

95. Please summarize historic pipeline releases over the past 10 years. For each release, please identify the date of the release, the amount of fluid released, the cause of the release, the environmental consequences of the release, the steps taken to cleanup the release, and any changes in design that were implemented to prevent similar future releases.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Approximately 23 billion gallons of geothermal brine flows through more than 17 miles of pipelines on an annual basis at the existing facilities. A review of existing facility records has resulted in the preparation of a summary of pipeline releases

from 1995 to present as set forth in Attachment CDR-95. Information prior to 1995 is not available. Likewise, the summary may be over- or under inclusive, having been based on the available information, summarized in an after-the fact manner that characterizes the release as it was when it occurred.

Cleanup of releases is effectuated by removal of free liquids with a vacuum truck, excavation of soils or other material as may be appropriate, sampling, and further removal as may be necessitated by the sampling results. The brine is a highly saline water solution with characteristics similar to that of existing ground water in the region.

In 2001, a leak mitigation team was put in place to address brine production piping leaks. Nondestructive examiners inspect piping by conducting nondestructive examinations (NDE) on piping through the facilities. Data for each production line has been logged and mapped and an enhanced preventative maintenance program was implemented to monitor the piping systems. A comparison of data obtained through the NDE process assists in better long-range forecasts of piping system integrity.

96. Please provide an analysis of the impact of a production and injection pipeline release on local soils, irrigation supplies, shallow groundwater, nearby wetland and other habitat, and the Salton Sea.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Please refer to response to CURE data request 95.

97. The AFC indicates that mitigation for a potential release include a protective pipeline design, a detailed inspection routine, preparation of a release response plan, and expeditious containment, control, and cleanup of released liquids." (AFC, p. 5.4-11.)

(a) Please identify all features of the pipeline that would mitigate a release.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

For protection against corrosion, a polymer concrete lining of approximately 1/2 inch in thickness will be applied to the inside diameter of the pipe prior to shipment to the site. The polymer concrete coating would be applied at a shop specifically qualified for this work. A quality assurance and inspection program would also be used to assure a high quality product. Prior to applying the concrete, the new pipe would be hydroblasted to remove any rust material to assure proper bonding of the concrete to the pipe.

The pipeline that carries brine over the wetlands from the Plan to OB3 will be contained within a second, outer carbon steel pipeline. The chamber between the inner and outer pipes will be monitored to detect a potential leak in the inner brine-carrying pipe. The outer carbon steel pipe would be designed to contain brine that might leak from within the inner pipe before the inner pipe could be shut down, at which time brine collected in the outer pipe would be bled off and disposed of in proper fashion.

(b) Please provide a copy of the detailed inspection routine.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Once operational, the brine pipeline will be subject to Nondestructive Examination (NDE) monitoring. NDE monitoring uses a transducer that transmits and receives an ultrasonic signal, gives the NDE technician a display of the wall thickness of the pipe on a liquid crystal display, and stores the data digitally for archiving and analysis. (The frequency range of the transducers is 2.25 megahertz to 10 megahertz. These signals will not travel in air, can only be introduced into the pipe through the use of the ultrasonic couplant, and are contained within the localized entry site.) Through NDE monitoring, thinning areas of the piping system can be detected and "mapped" for analysis. As pipe reaches minimum allowable operating thickness, it can be replaced, while areas with remaining useful life continue to be monitored for corrosion. Corrosion rates have been determined through past inspections and data comparison.

(c) Please provide a copy of the containment, control, and cleanup procedures.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

Prior to start of construction, the Applicant will have emergency response/contingency plans in place to guide employee actions in the event of a leak, including identification, notification and containment.

98. Would the applicant be willing to incorporate additional design features not identified in subpart (98) to collect any released fluids, such as use of double-walled pipeline or a trough or sump beneath the pipelines to collect any released fluids? If no, please explain why not.

Response:

Subject to the above-referenced General Objections and Qualifications, and without waiving the same, Applicant responds:

No. The Applicant believes that sufficient mitigation measures have already been identified for implementation that will be protective in such an event. Please see response to CURE Data Request 97.

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Checked by	Date	Sheet No. 1 OF 4

For SALTON SEA UNIT 6 - CUT & FILL

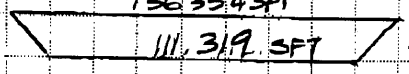
CUT (REF 1 #2)

SITE TOTAL SQFT.
2563.60 x 1485.75 = 3,808,868 SF

Remove 6" Top Soil = 3,808,868 x 0.5 ÷ 27 = 70,534. CY.

WATER POND (REF 1 #3)

$$\frac{136,354 + 111,319}{2} \times 4.9 = 606798 \text{ CFT} = 22474 \text{ CYD}$$

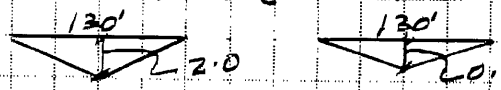


TYP CROSS SECTION OF POND

DETENTION POND (REF 1 #3)

NORTH WEST POND
PLAN AREA - 96306 SFT
$V = \frac{96306 \times 2}{27} = 7134$ CYD

NORTH POND (TRUCK PARKING) 1700' LONG



CROSS SECT. $= \frac{130 \times 2}{2} + \frac{130 \times 0.5}{2}$

$= \frac{130 + 32.5}{2} \times 1700 = 138125 = 5116$ CYD

SUB TOTAL 7134 + 5116 = 12250 CYD

TOTAL CUT 70534 + 22474 + 12250 = 105258

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JPN		20002094
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For SALTON SEA UNIT 6 - CUT & FILL

FILL (BASE PROFILES DERIVES FROM REF 1)

NORTH ROAD AND DIKE

AVG. CROSS SECT. AREA 191 SFT.
V = 191 x 2545 = 486,095 CFT

EAST ROAD AND DIKE

AVG. CROSS SECT. AREA 148.67 SFT.
V = 148.67 x 1428 = 212300 CFT

SOUTH ROAD AND DIKE

AVG. CROSS SECT. AREA 222.5 SFT
V = 222.5 x 2545 = 566263 CFT

WEST CROSS SECT. AREA 102.67 SFT
V = 102.67 x 1428 = 146613 CFT

SUB TOTAL FILL = 1,411,271 CFT

= 52,269 CYD

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Checked by		Date	Sheet No. 3 OF 4

For SALTON SEA UNIT 6 – CUT & FILL

BRINE POND (REF 2)

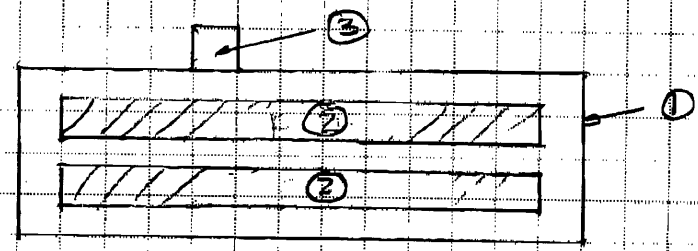
(+) $\left(\frac{318 \times 952 + 286 \times 920}{2}\right) \times 8 = 2263424$ CFT (1)

2 POND (-) $\left(\frac{88 \times 800 + 60 \times 772}{2}\right) \times 2 \times 7 = 817040$ CFT (2)

(+) $\left(\frac{96 \times 92 + 60 \times 80}{2}\right) \times 8 = 54528$ CFT (3)

SUB TOTAL FILL 2263424 + 54,528 – 817,040

= 1,500,912 CFT = 55589 CYD



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Checked by		Date	Sheet No. 4 OF 4

For SALTON SEA UNIT 6 – CUT & FILL

PLOT PAN AVERAGE FILL (REF 1, 3 & 4)

AREA – (1) 343791 SFT x 1.33 = 457242 CFT

AREA – (2) 1,147,960 SFT x 1.00 = 1,147,960 CFT

Sub Total = 1605202 CFT = 59452 CYD

TOTAL FILL FROM SHEET 2, 3 & 4

= 52269 + 55589 + 59452

TOTAL = 167,310 CYD

TOTAL CUT 105,258 CYD (105,000 say)

TOTAL FILL 167,310 CYD (167,000 say)

REFERENCES:

1. SALTON SEA UNIT 6 FIG 3.3-11 "ROUGH GRADING PLAN" DWG NO 21-043-SD-SK4A, REV A, 2/12/02.
2. SALTON SEA UNIT 6, "FIGURE – 3.3-7 BRINE POND PLAN, SECTION AND DETAIL", DWG. NO 21-043-SD-002, REV A, 3/28/02.
3. INFORMATION FROM REF 1, CAD-DATA BASE.
4. INFORMATION FROM REF 1, CAD-DATA BASE & PROFILES AT VARIOUS LOCATIONS.

TABLE R-1 CONSTRUCTION FUGITIVE DUST - WIND EROSION

MONTH	POWER PLANT (acres)	LAYDOWN AREA (acres)	PARK AREA (acres)	ACCESS ROAD (acres)	WELL PADS (acres)	WELLPAD ACCESS (acres)	PIPELINE ROUTE (acres)	TL ROUTE (acres)	DISTRUBED AREA (acres)	UNCONTROLLED EMISSIONS (tons/month)	CONTROLLED EMISSIONS (lbs/month)	CONTROLLED EMISSIONS (tons/year)
1	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	4.3	3.0	---	---	---	---	7.3	0.11	43.8	---
4	---	---	4.3	3.0	---	---	---	---	7.3	0.11	43.8	---
5	---	20.9	4.3	3.0	---	---	---	---	28.2	0.42	169.2	---
6	78.6	20.9	4.3	3.0	---	---	7.7	---	114.5	1.72	687.1	---
7	78.6	20.9	4.3	3.0	---	---	7.7	---	114.5	1.72	687.1	---
8	78.6	20.9	4.3	3.0	---	---	7.7	---	114.5	1.72	687.1	---
9	78.6	20.9	4.3	3.0	4.8	---	7.7	---	119.3	1.79	716.0	---
10	78.6	20.9	4.3	3.0	9.6	0.8	7.7	---	124.9	1.87	749.5	---
11	78.6	20.9	4.3	3.0	9.6	0.8	7.7	---	124.9	1.87	749.5	---
12	78.6	20.9	4.3	3.0	9.6	2.3	7.7	---	126.4	1.90	758.6	2.65
13	78.6	20.9	4.3	3.0	9.6	2.3	7.7	---	126.4	1.90	758.6	3.03
14	78.6	20.9	4.3	3.0	9.6	1.5	7.7	---	125.7	1.89	754.1	3.40
15	78.6	20.9	4.3	3.0	14.5	2.6	7.7	---	131.6	1.97	789.6	3.78
16	78.6	20.9	4.3	3.0	14.5	3.3	7.7	---	132.4	1.99	794.2	4.15
17	78.6	20.9	4.3	3.0	14.5	3.3	7.7	---	132.4	1.99	794.2	4.46
18	78.6	20.9	4.3	3.0	14.5	3.3	7.7	92.0	224.4	3.37	1346.2	4.79
19	78.6	20.9	4.3	3.0	14.5	5.3	7.7	65.6	199.9	3.00	1199.5	5.05
20	78.6	20.9	4.3	3.0	14.5	7.6	7.7	45.9	182.5	2.74	1095.0	5.25
21	78.6	20.9	4.3	3.0	14.5	4.6	7.7	58.5	192.1	2.88	1152.4	5.47
22	78.6	20.9	4.3	3.0	14.5	1.5	7.7	49.6	180.1	2.70	1080.8	5.64
23	78.6	20.9	4.3	3.0	9.6	1.5	3.9	51.7	173.6	2.60	1041.5	5.78
24	78.6	20.9	4.3	3.0	4.8	---	3.9	42.9	158.4	2.38	950.6	5.88
25	78.6	20.9	4.3	3.0	4.8	---	3.9	34.9	150.4	2.26	902.6	5.95
26	---	20.9	4.3	3.0	4.8	---	3.9	8.0	44.9	0.67	269.5	5.71

Notes:

Uncontrolled wind erosion emission factor of 0.015 tons PM10/ acre-month (29.7 lbs/acre-month) from MRI, 1996 page 5-6.

80% control efficiency applied per proposed mitigation measures.

TABLE R-2 CONSTRUCTION FUGITIVE DUST - CARRY OUT/ TRACK OUT

MONTH	NUMBER OF WORKER VEHICLES PER MONTH	NUMBER OF WORKER VEHICLES PER DAY	NUMBER OF DELIVERY TRUCKS PER MONTH	NUMBER OF DELIVERY TRUCKS PER DAY	TOTAL VEHICLES ENTERING/LEAVING SITE (total passes)	UNCONTROLLED EMISSIONS (grams/day)	UNCONTROLLED EMISSIONS (lbs/month)	CONTROLLED EMISSIONS (tons/month)	CONTROLLED EMISSIONS (lbs/year)
1	16	0.8	0	0.0	1.6	8.80	0.001	0.000	---
2	24	1.2	0	0.0	2.4	13.20	0.001	0.000	---
3	33	1.7	0	0.0	3.3	18.15	0.002	0.000	---
4	36	1.8	0	0.0	3.6	19.80	0.002	0.000	---
5	45	2.3	0	0.0	4.5	24.75	0.003	0.001	---
6	98	4.9	25	1.3	12.3	67.65	0.007	0.001	---
7	115	5.8	60	3.0	17.5	96.25	0.011	0.002	---
8	134	6.7	55	2.8	18.9	103.95	0.011	0.002	---
9	282	14.1	203	10.2	48.5	630.50	0.069	0.014	---
10	365	18.3	423	21.2	78.8	1024.40	0.113	0.023	---
11	399	20.0	596	29.8	99.5	1293.50	0.142	0.028	---
12	409	20.5	715	35.8	112.4	1461.20	0.161	0.032	0.10
13	381	19.1	531	26.6	91.2	1185.60	0.131	0.026	0.13
14	424	21.2	484	24.2	90.8	1180.40	0.130	0.026	0.16
15	480	24.0	567	28.4	104.7	1361.10	0.150	0.030	0.19
16	510	25.5	568	28.4	107.8	1401.40	0.154	0.031	0.22
17	507	25.4	555	27.8	106.2	1380.60	0.152	0.030	0.25
18	509	25.5	514	25.7	102.3	1329.90	0.146	0.029	0.27
19	553	27.7	447	22.4	100.0	1300.00	0.143	0.029	0.30
20	545	27.3	453	22.7	99.8	1297.40	0.143	0.029	0.33
21	546	27.3	445	22.3	99.1	1288.30	0.142	0.028	0.34
22	443	22.2	270	13.5	71.3	926.90	0.102	0.020	0.34
23	380	19.0	252	12.6	63.2	821.60	0.090	0.018	0.33
24	218	10.9	150	7.5	36.8	478.40	0.053	0.011	0.31
25	147	7.4	112	5.6	25.9	336.70	0.037	0.007	0.29
26	61	3.1	112	5.6	17.3	95.15	0.010	0.002	0.26

Notes:

- **Uncontrolled track out/carry out emission factor from MRI, 1996 page 5-8.**
- **80% control efficiency applied per proposed mitigation measures.**

JW6H-UF40 (JDFP-06WR)

FIRE PUMP DRIVER

EMISSION DATA

To complete an application for a Permit to Operate, the following data is provided.

6 *Cylinders*
Four *Cycle*
Lean *Burn*
Turbocharged & Aftercooled
Diesel Oil - *Fuel*
No - *Energy Recovery from Exhaust*
No - *Emission Control Device*

RPM	BHP	FUEL GAL/HR (L/HR)	AIR/FUEL RATIO	GRAMS / HP / HR HC**	NOx	CO	SO_2	PART.***	% O_2	EXHAUST °F (°C)	EXHAUST CFM (m^3/min)	TIMING RETARD*
1470	240	13.0 (49.2)	22.79	0.10	5.6	0.24	0.17	0.07	7.6	1030 (554)	1276 (36)	9.7
1760	290	13.5 (51.1)	29.35	0.08	5.7	0.25	0.14	0.07	10.8	855 (457)	1506 (43)	9.7
2100	300	14.2 (53.8)	34.47	0.15	5.2	0.27	0.14	0.09	12.3	770 (410)	1740 (49)	9.7
2350	300	14.5 (54.9)	40.97	0.15	5.2	0.27	0.15	0.09	13.6	738 (392)	2058 (58)	9.7

For specific RPM & BHP ratings, some of the above data may have been extrapolated from the best available test data.

Sulfur Dioxide based on 0.05% sulfur content in fuel (by weight).

**Degrees of Timing RETARD for 'Beginning of Injection' based on comparison with pre-emission controlled engines.*

***HC is a measure of total hydrocarbons, including Non Methane Hydrocarbons (NMHC).*

****Part. is a measure of total particulates, including* PM_{10}.

6081H Base Model Engine Manufactured by John Deere Co.

CLARKE
FIRE PROTECTION PRODUCTS
3133 EAST KEMPER ROAD
CINCINNATI, OH 45241

Calendar Year: 2002 -- Model Years: 1965 to 2002 Salton Sea Air Basin Emission units: Tons per Day

EMFAC2000 Default Scenario Salton Sea Air Basin I and M: See county detail

EMFAC2000 Version 2.02 01/25/02

	LDA-NCAT	LDA-CAT	LDA-DSL	LDA-TOT	LDT1-NCA	LDT1-CAT	LDT1-DSL	LDT1-TOT	LDT2-NCAT	LDT2-CAT	LDT2-DSL	LDT2-TOT	MDV-NCAT	MDV-CAT	MDV-DSL	MDV-TOT	LHDT1-NCAT
Vehicles	8006	208638	1500	218144	3861	33959	374	38194	1004	59300	202	60507	3221	24322	2631	30174	769
VMT/1000	192	7738	43	7972	96	1190	11	1298	25	2285	7	2317	81	918	98	1096	7
Trips	36762	1315435	8785	1360981	18049	210623	2199	230871	4737	378251	1246	384233	16015	153947	16587	186549	25426
Total Organic Gas Emissions																	
Run Exh	1.27	3.25	0.05	4.58	0.62	0.68	0.01	1.31	0.16	0.76	0	0.92	0.64	0.48	0.07	1.19	0.05
Idle Exh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Ex	0.21	1.79	0	2	0.1	0.31	0	0.41	0.02	0.45	0	0.47	0.11	0.26	0	0.37	0.16
Total Ex	1.48	5.04	0.05	6.57	0.72	0.99	0.01	1.72	0.19	1.21	0	1.4	0.75	0.74	0.07	1.56	0.21
Diurnal	0.13	0.9	0	1.03	0.06	0.2	0	0.27	0.02	0.19	0	0.2	0.05	0.1	0	0.15	0
Hot Soak	0.14	0.53	0	0.67	0.07	0.13	0	0.19	0.02	0.11	0	0.13	0.06	0.06	0	0.12	0.04
Running	0.71	2.11	0	2.82	0.21	0.51	0	0.72	0.05	0.5	0	0.55	0.14	0.26	0	0.4	0.21
Resting	0.04	0.22	0	0.26	0.02	0.05	0	0.07	0.01	0.05	0	0.05	0.02	0.03	0	0.04	0
Total	2.49	8.81	0.05	11.35	1.08	1.88	0.01	2.97	0.28	2.05	0	2.34	1.02	1.18	0.07	2.27	0.46
Carbon Monoxide Emissions																	
Run Exh	14.45	60.36	0.05	74.86	7	16.85	0.02	23.86	1.83	17.13	0.01	18.97	9.9	9.35	0.07	19.32	1.49
Idle Exh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01
Start Ex	1.33	17.16	0	18.49	0.65	3.94	0	4.59	0.17	4.53	0	4.7	0.98	2.64	0	3.62	2.85
Total Ex	15.78	77.52	0.05	93.35	7.64	20.8	0.02	28.45	1.99	21.66	0.01	23.66	10.89	11.99	0.07	22.94	4.34
Oxides of Nitrogen Emissions																	
Run Exh	0.91	6.45	0.11	7.47	0.45	1.69	0.03	2.17	0.12	2.66	0.01	2.79	0.58	1.47	0.19	2.25	0.08
Idle Exh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Ex	0.06	1.01	0	1.06	0.03	0.19	0	0.22	0.01	0.44	0	0.45	0.04	0.2	0	0.24	0.05
Total Ex	0.96	7.46	0.11	8.53	0.48	1.88	0.03	2.39	0.12	3.11	0.01	3.25	0.62	1.67	0.19	2.48	0.13
Carbon Dioxide Emissions (000)																	
Run Exh	0.1	3.3	0.02	3.43	0.05	0.6	0.01	0.66	0.01	1.15	0	1.17	0.05	0.65	0.04	0.74	0
Idle Exh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Ex	0.01	0.11	0	0.12	0	0.02	0	0.03	0	0.04	0	0.04	0	0.02	0	0.03	0.01
Total Ex	0.11	3.41	0.02	3.55	0.06	0.62	0.01	0.68	0.01	1.19	0	1.21	0.05	0.67	0.04	0.77	0.01
PM10 Emissions																	
Run Exh	0.01	0.1	0.01	0.11	0	0.02	0	0.02	0	0.05	0	0.05	0	0.02	0.01	0.03	0
Idle Exh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Start Ex	0	0.01	0	0.01	0	0	0	0	0	0.01	0	0.01	0	0	0	0	0
Total Ex	0.01	0.11	0.01	0.12	0	0.02	0	0.03	0	0.06	0	0.06	0	0.02	0.01	0.04	0
TireWear	0	0.07	0	0.07	0	0.01	0	0.01	0	0.04	0	0.04	0	0.02	0	0.02	0
BrakeWr	0	0.11	0	0.11	0	0.02	0	0.02	0	0.07	0	0.07	0	0.03	0	0.03	0
Total	0.01	0.28	0.01	0.3	0.01	0.05	0	0.06	0	0.17	0	0.17	0	0.07	0.01	0.08	0
Lead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SOx	0	0.05	0	0.05	0	0.01	0	0.01	0	0.02	0	0.02	0	0.01	0	0.01	0
Fuel Consumption (000 gallons)																	
Gasoline	14.42	363.44	0	377.86	7.11	67.11	0	74.22	1.87	125.74	0	127.61	7.55	70.63	0	78.18	1.85
Diesel	0	0	1.84	1.84	0	0	0.49	0.49	0	0	0.28	0.28	0	0	3.9	3.9	0

	Emission Sources								Internal (Non-Emission) Streams					
	Cooling Tower Liquid Emission per cell		Cooling Tower Gas Emission per cell		Dilution Water Heater Liquid Emission per unit		Dilution Water Heater Gas Emission per unit		HP Condenser Noncondensable Gas		SP/LP Condenser Noncondensable Gas		Circulating Cooling Water	
Stream Flow	38.7 lb/hr		6,531,806 lb/hr		100.6 lb/hr		204,567 lb/hr		44,170 lb/hr		101.5 lb/hr		126,345,980 lb/hr	
Chemical Species	lb/hr	ppm	lb/hr	ppm	lb/hr	ppm	lb/hr	ppm	lb/hr	ppm	lb/hr	ppm	lb/hr	ppm
H^+	0.0000	0.000	0.000	0.000	0.000	0.000	0.0000	0.000	0.0000	0.000	0.0000	0.000	0.000	0.000
Li^+	0.0000	0.124	0.000	0.000	0.000	0.481	0.0000	0.000	0.0000	0.000	0.0000	0.000	15.67	0.124
Be^{+2}	0.0000	0.000	0.000	0.000	0.000	0.000	0.0000	0.000	0.0000	0.000	0.0000	0.000	0.001	0.000
NH_4^+	0.0000	0.245	0.000	0.000	0.000	0.948	0.0000	0.000	0.0000	0.000	0.0000	0.000	30.92	0.245
Na^+	0.0476	1,231.175	0.000	0.000	0.013	129.273	0.0000	0.000	0.0000	0.000	0.0000	0.000	155,554.02	1,231.175
Mg^{+2}	0.0016	42.224	0.000	0.000	0.000	0.101	0.0000	0.000	0.0000	0.000	0.0000	0.000	5,334.83	42.224
Al^{+3}	0.0000	0.000	0.000	0.000	0.000	0.001	0.0000	0.000	0.0000	0.000	0.0000	0.000	0.02	0.000
K^+	0.0006	15.360	0.000	0.000	0.003	32.940	0.0000	0.000	0.0000	0.000	0.0000	0.000	1,940.73	15.360
Ca^{+2}	0.0051	131.968	0.000	0.000	0.006	63.347	0.0000	0.000	0.0000	0.000	0.0000	0.000	16,673.60	131.968
Cr^{+3}	0.0000	0.000	0.000	0.000	0.000	0.000	0.0000	0.000	0.0000	0.000	0.0000	0.000	0.000	0.000
Mn^{+2}	0.0000	0.661	0.000	0.000	0.000	2.534	0.0000	0.000	0.0000	0.000	0.0000	0.000	83.54	0.661
Fe^{+2}	0.0000	0.861	0.000	0.000	0.000	3.041	0.0000	0.000	0.0000	0.000	0.0000	0.000	108.75	0.861
Ni^{+2}	0.0000	0.000	0.000	0.000	0.000	0.000	0.0000	0.000	0.0000	0.000	0.0000	0.000	0.00	0.000
Cu^{+2}	0.0000	0.004	0.000	0.000	0.000	0.010	0.0000	0.000	0.0000	0.000	0.0000	0.000	0.55	0.004
Zn^{+2}	0.0000	0.212	0.000	0.000	0.000	0.824	0.0000	0.000	0.0000	0.000	0.0000	0.000	26.80	0.212
Rb^+	0.0000	0.046	0.000	0.000	0.000	0.177	0.0000	0.000	0.0000	0.000	0.0000	0.000	5.77	0.046
Sr^{+2}	0.0001	1.950	0.000	0.000	0.000	1.140	0.0000	0.000	0.0000	0.000	0.0000	0.000	246.41	1.950
Ag^+	0.0000	0.000	0.000	0.000	0.000	0.001	0.0000	0.000	0.0000	0.000	0.0000	0.000	0.02	0.000
Cd^{+2}	0.0000	0.001	0.000	0.000	0.000	0.003	0.0000	0.000	0.0000	0.000	0.0000	0.000	0.10	0.001
Sb^{+3}	0.0000	0.001	0.000	0.000	0.000	0.002	0.0000	0.000	0.0000	0.000	0.0000	0.000	0.07	0.001
Cs^+	0.0000	0.008	0.000	0.000	0.000	0.032	0.0000	0.000	0.0000	0.000	0.0000	0.000	1.03	0.008
Ba^{+2}	0.0000	0.264	0.000	0.000	0.000	0.456	0.0000	0.000	0.0000	0.000	0.0000	0.000	33.35	0.264
Hg^{+2}	0.0000	0.021	0.000	0.000	0.000	0.000	0.0002	0.001	0.00000079	0.00002	0.00000157	0.015	2.67	0.021
Pb^{+2}	0.0000	0.052	0.000	0.000	0.000	0.203	0.0000	0.000	0.0000	0.000	0.0000	0.000	6.60	0.052
HCO_3^-	0.0088	226.434	0.000	0.000	0.000	0.177	0.0000	0.000	0.0000	0.000	0.0000	0.000	28,609.02	226.434
NO_3^-	0.0000	0.583	0.000	0.000	0.000	0.000	0.0000	0.000	0.0000	0.000	0.0000	0.000	73.62	0.583
F^-	0.0000	0.013	0.000	0.000	0.000	0.051	0.0000	0.000	0.0000	0.000	0.0000	0.000	1.65	0.013
SO_4^{-2}	0.1012	2,615.400	0.000	0.000	0.000	0.253	0.0000	0.000	0.0000	0.000	0.0000	0.000	330,445.27	2,615.400
Cl^-	0.0080	207.681	0.000	0.000	0.036	354.741	0.0000	0.000	0.0000	0.000	0.0000	0.000	26,239.61	207.681
AsO_4^{-3}	0.0000	0.013	0.000	0.000	0.000	0.051	0.0000	0.000	0.0000	0.000	0.0000	0.000	1.649	0.013
SeO_4^{-2}	0.0000	0.000	0.000	0.000	0.000	0.000	0.0000	0.000	0.0000	0.000	0.0000	0.000	0.001	0.000
Br^-	0.0000	0.059	0.000	0.000	0.000	0.228	0.0000	0.000	0.0000	0.000	0.0000	0.000	7.421	0.059
I^-	0.0000	0.007	0.000	0.000	0.000	0.025	0.0000	0.000	0.0000	0.000	0.0000	0.000	0.825	0.007
SiO_2	0.0009	22.039	0.000	0.000	0.000	1.115	0.0000	0.000	0.0000	0.000	0.0000	0.000	2,784.48	22.039
CO_2	0.0000	0.000	2,120.461	324.636	0.000	0.028	0.0000	0.000	42,328	958,303.7	84.8226	835,852.2	0.000	0.000
$B(OH)_3$	0.0000	1.194	0.000	0.000	0.000	4.637	0.0000	0.000	0.0000	0.000	0.0000	0.000	150.89	1.194
NH_3	0.0000	0.000	35.606	5.451	0.000	0.000	8.2672	40.413	0.1520	3.440	0.0187	183.97	0.000	0.000
CH_4	0.0000	0.000	6.302	0.965	0.000	0.000	0.0000	0.000	113.43	2,567.98	12.6023	124,184.9	0.000	0.000
H_2S	0.0000	0.000	0.038	0.006	0.000	0.000	0.3389	1.657	152.73	3,457.71	0.4173	4,111.7	0.000	0.000
Scale Inhibitor	0.0003	7.000	0.000	0.000	0.000	0.000	0.0000	0.000	0.0000	0.000	0.0000	0.000	884.42	7.000
Benzene	0.0000	0.000	0.0088	0.0013	0.000	0.000	0.0000	0.000	3.1680	71.724	0.3520	3,468.48	0.000	0.000
Toluene	0.0000	0.000	0.0002	0.0000	0.000	0.000	0.0000	0.000	0.0436	0.987	0.0048	47.737	0.000	0.000
Xylenes	0.0000	0.000	0.0000	0.0000	0.000	0.000	0.0000	0.000	0.0053	0.121	0.0006	5.849	0.000	0.000
Ethylbenzene	0.0000	0.000	0.0000	0.0000	0.000	0.000	0.0000	0.000	0.0019	0.042	0.0002	2.049	0.000	0.000
Arsine	0.0000	0.000	0.0001	0.0000	0.000	0.000	0.0000	0.000	0.0180	0.407	0.0020	19.703	0.000	0.000
Radon, Ci	0.0000	0.000	0.0007	0.0001	0.000	0.000	0.0000	0.000	0.0130	0.293	0.0014	14.193	0.000	0.000
TDS	0.1741	4,505.599			0.060	596.819							569,264	4,505.599

REVISION 3: August 2001 MATERIAL SAFETY DATA SHEET Page 1/4

1 IDENTIFICATION OF THE PRODUCT AND OF THE COMPANY

1.1 Identification of the Product: **ARI-340 LO-CAT® IRON CONCENTRATE**

1.2 Manufacturer:

Gas Technology Products LLC
1501 E. Woodfield Road, Suite 200 West,
Schaumburg, IL 60173-5417, U.S.A.

Manufacturer's Emergency Tel. No:

USA	1-800-424 9300
International	001-800 424 9300

1.3 EC Supplier:

EC Supplier's Emergency Tel. No:

2 COMPOSITION/INFORMATION ON INGREDIENTS

Substance	CAS No.	% Present	EEC Symbol(s)	R-Phrases
EDTA Ammonium iron	21265-50-9	<40	Xi (Irritant)	36/38
Trisodium nitrilotriacetate	5064-31-3	<12	Xn (Harmful)	22-36/38
Other components and water	-	Up to 100	-	-

3 HAZARDS IDENTIFICATION

Irritating to the eyes and skin.

4 FIRST AID MEASURES

Remove contaminated clothing and launder before re-use.

In case of swallowing	- Wash out mouth thoroughly with water, symptomatic treatment for possible irritation of mucous membranes; medical attention.
In case of inhalation	- If mist or aerosol is inhaled, remove to fresh air; symptomatic treatment.
In case of contact with eyes	- Rinse immediately with plenty of water for at least 15 minutes and seek medical attention.
In case of contact with skin	- Wash with plenty of water; if irritation persists or develops, seek medical advice.

5 FIRE-FIGHTING MEASURES

5.1 Extinguishing media:

Suitable	-	Will not burn until dried out; Water jets may be used for cooling drums.
Not suitable	-	None - use extinguishing media appropriate for primary cause of fire.

5.2 If involved in a fire: May give off noxious fumes (e.g. oxides of carbon, nitrogen, sodium, cyanides, iron, and ammonia). May generate flammable hydrogen gas in contact with aluminium or zinc. Wear breathing apparatus and protective clothing.

6 ACCIDENTAL RELEASE MEASURES

Observe any warning labels on the container (see Sections 14 and 15). Take precautions to avoid exposure (See Section 8).

Contain any spilled material immediately with dry agent (sand, vermiculite, etc.) and vacuum or shovel into labelled containers for disposal (See Section 13).

7 HANDLING AND STORAGE

7.1 Handling: Handle/weigh this product under conditions of good local exhaust ventilation to avoid breathing mist or aerosol, swallowing, and eye and skin contact. If this is not possible, use personal protective equipment (Section 8).

7.2 Storage: Store in a cool place and replace lid after use.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Respiratory: Wear respiratory protection to prevent inhalation of irritant mists or aerosols, if formed during handling, and to prevent exceeding regulatory levels (see Section 16).

8.2 Hand: Rubber gloves or gauntlets 8.3 Eye: Goggles or eye/face shield

8.4 Skin: Proper work attire (ie. Long sleeve shirt, long pants, boots)

9 PHYSICAL AND CHEMICAL PROPERTIES [1]

9.1 Appearance:	Dark red liquid	9.2 Odour:	Ammoniacal
9.3 pH:	9.3, approx.	9.4 Boiling Pt./range:	>100°C.
9.5 Freezing Pt./range:	-8°C, approx.		
9.6 Flash point:	Not flammable (aqueous solution).		
9.7 Flammability:	See 9.6	9.8 Autoflammability:	See 9.6
9.9 Explosive properties:	Not explosive		
9.10 Oxidising properties:	Not an oxidiser	9.11 Vapour pressure:	35 mm Hg, approx.
9.12 Relative density (H_2O = 1):	1.26, approx.	9.13 Bulk density:	See 9.12
9.14 Solubility:	Water - Miscible in all proportions Fat (type) - Not miscible Other solvents - Not determined		
9.15 Partition coefficient:	Log $P_{o/w}$ (Octanol/water) - Not determined		
9.16 Other data:	Volatiles = 55% w/w, approx.		

10 STABILITY AND REACTIVITY

10.1 Conditions to avoid: None known.

10.2 Materials to avoid: Do not mix with strong oxidising agents or strong acids. Contact with strong alkalis will liberate ammonia. Contact with aluminium or zinc may produce flammable hydrogen gas.

10.3 Hazardous decomposition products: Oxides of carbon, nitrogen, sodium and iron, and ammonia may be released on burning or heating to decomposition.

11 TOXICOLOGICAL INFORMATION

Acute effects[2-5]

Based on the properties of its component substances, may be irritating to the eyes and skin. Unlikely to be "harmful" by swallowing or in contact with skin (estimated oral and dermal LD_{50} >2000 mg/kg, rat). However, ingestion of large amounts may cause hypo-calcenic tetany (muscle cramps) with spontaneous recovery.

Chronic effects[4-6]

Trisodium nitrilotriacetate has been reported by NATIONAL TOXICOLOGY PROGRAM to have produced positive carcinogenic effects in dosed-feed studies in rats but not in mice. It is classified by INTERNATIONAL ASSOCIATION FOR THE RESEARCH OF CARCINOGENS as category 2B (possible human) carcinogen. These tests were made at levels which were far higher than anticipated human exposure levels and were associated with severe tissue damage. Therefore, no human effects are expected when precautions are taken to prevent acute effects given above.

12 ECOLOGICAL INFORMATION

Based on the properties of its components, unlikely to be harmful to aquatic organisms (i.e. estimated LC_{50} >100 mg/l)[3].

13 DISPOSAL CONSIDERATIONS

Users should acquaint themselves with local regulations.

Disposal may be carried out by evaporating and burning under controlled conditions at a licensed waste material processor; stack gases will need to be scrubbed (See Section 5 above); or by disposal at an approved landfill.

14 TRANSPORT INFORMATION

Proper Shipping Name: CORROSIVE LIQUID, N.O.S. (Contains metal chelates which are corrosive to aluminium and/or carbon steel)

UN No.: 1760 Symbols:

Hazard Class: 8 Packing Group: III

ADR/RID Item No: 66(c) HIN: 80 EAC: 2X

IATA/DGR limits: Passenger - 5 litre (1 litre non-UN packs)
Cargo - 60 litre

IMDG/IMO Code: 8147 EmS: 8-15 MFAG: 760

Tremcard No.: 80G20

Complies with International Maritime Dangerous Goods Code (IMDG Code); Harmony Code Number (Schedule B Number); 3815.19.0000

U.S. DOT: Hazard Class Designation (when shipped in a non-bulk container only). Corrosive liquid, n.o.s., (contains metal chelates which are corrosive to aluminum and/or carbon steel), UN 1760, Class 8, PG III. Exempt from DOT regulations when transported by motor vehicle or rail car in a bulk packaging constructed of materials that will not react to dangerously with or be degraded by the corrosive material.

15 REGULATORY INFORMATION

Components listed as "dangerous" in Annex I to Directive 67/548/EEC[3]

Component or impurity	Annex I Number
Ammonia solution	007-001-01-2

Classified according to the Directives 67/548/EEC and 88/379/EEC, and their various amendments, and labelled as below:-
(ARI-340 LO-CAT® IRON CONCENTRATE)

Warning symbol - St. Andrew's Cross (Xi)

Warning words	-	IRRITANT	
Risk phrases	-	R36/38:	Irritating to eyes and skin
Safety Phrases	-	S26:	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
		S36/37/39:	Wear suitable protective clothing, gloves and eye/face protection

16 OTHER INFORMATION

Occupational Exposure Levels	8h-TWA	mg/m^3 Short-term	Reference
Iron salts (as Fe)	1	2 (15-min)	UK
	1	-	Norway, Finland,
US-ACGIH			
Trisodium nitrilotriacetate	1	2 (15-min)	Supplier's suggested limit
Ammonia	17	24 (15-min)	UK. US-ACGIH
	18	30 (15-min)	Finland
	18	-	Norway, Sweden, Denmark
	35	70 (5-min)	Germany

Germany - Wassergefährdungsklasse (WGK) = 1 (mildly water polluting), self-classification.
Inventories - All components are listed in EINECS and TSCA
Intended uses - Iron concentrate used in **LO-CAT®** process. No other use is intended.
Revisions - The latest information changes are marked with in the left margin
References - (1) In-house data files
(2) Aldrich Catalogue Handbook of Fine Chemicals, 1994-5.
(3) Supplier's Safety Data Sheets on components
(4) Sax's Dangerous Properties of Industrial Materials, 9th Edit., 1994.
(5) Dictionary of Substances & Their Effects, Richardson et al, RSC, 1994
(6) NTIS Report TR-006 PB266177/AS.
(7) Handbook of Environmental Data on Organic Chemicals, Verscheuren, 2nd Edit., Von Nostrand Reinhold, 1983.
(8) Annex I to Dangerous Substance Directive 67/548/EEC

The format of this Safety Data Sheet conforms to the requirements of EC Directive 91/155/EEC.

REVISION 2: April 2002 SAFETY DATA SHEET Page 1/5

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of the Preparation: **ARI-350 LO-CAT® CHELATE CONCENTRATE**

1.2 Company:

Gas Technology Products LLC
1501 E. Woodfield Road, Suite 200 West,
Schaumburg, IL 60173-5417, U.S.A.

1.3 Company Emergency Tel. No:

USA	1-800-424 9300
→International	1-703-527-3887

2 COMPOSITION/INFORMATION ON INGREDIENTS

Substance	CAS No.	% Present	EEC Symbol(s)	R-Phrases
Trisodium nitrilotriacetate	5064-31-3	<40	Xn (Harmful)	22-36/38
Other components and water	----	Up to 100	----	----

3 HAZARDS IDENTIFICATION

→Harmful if swallowed or inhaled. Irritating to the eyes and skin.

4 FIRST-AID MEASURES

In case of swallowing: Do not induce vomiting. If victim is alert and not convulsing rinse mouth with water and give plenty of water to drink. If spontaneous vomiting occurs, have affected person lean forward with head down to avoid breathing in of vomitus. Rinse mouth again and give more water to drink. Obtain medical attention.

In case of inhalation: Product is non-volatile. If mist or aerosol is inhaled, remove affected person from area to fresh air and provide oxygen if breathing is difficult. Give artificial respiration ONLY if breathing has stopped and give CPR ONLY if there is no breathing and no pulse.

In case of contact with eyes: Immediately irrigate eyes with flowing water continuously for 15 minutes while holding eyes open. Contact lenses should be removed before or during flushing. Obtain medical attention immediately. DO NOT instruct person to neutralize.

In case of contact with skin: Immediately remove clothing from affected area and wash skin for 15 minutes with flowing water and soap. Clothing should be discarded or washed before reuse. Obtain medical assistance if irritation develops. DO NOT instruct person to neutralize affected skin area.

5 FIRE-FIGHTING MEASURES

Suitable extinguishing media: Will not burn until dried out; water jets may be used for cooling drums.

Extinguishing media which should NOT be used: None - use extinguishing media appropriate for primary cause of fire.

Special exposure hazards: Oxides of carbon or nitrogen; and cyanides may be released on burning or heating to decomposition.

Special protective equipment: Wear Self Contained Breathing Apparatus. Non-emergency personnel should be removed from the area immediately.

6 ACCIDENTAL RELEASE MEASURES

Observe any warning labels on the container (See Sections 14 and 15). Take precautions to avoid exposure (See Section 8).

Contain any spilled material immediately with dry agent (sand, vermiculite, etc.) and vacuum or shovel into labelled containers for disposal (See Section 13). DO NOT DUMP INTO ANY SEWERS, ON THE GROUND OR INTO ANY BODY OF WATER.

7 HANDLING AND STORAGE

7.1 Handling: Handle/weigh this product under conditions of good local exhaust ventilation to avoid breathing mist or aerosol. Avoid swallowing and eye and skin contact. Use personal protective equipment (See Section 8).

7.2 Storage: Store in a cool place above 5°C (41°F) and replace lid after use.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory Protection: Wear respiratory protection to prevent inhalation of harmful mists or aerosols, if formed during handling, and to prevent exceeding regulatory levels.

→ Hand Protection: 100% nitrile or latex gloves or gauntlets conforming to EN 374.

Eye Protection: goggles or eye/face shield

Skin Protection: proper work attire (ie. long sleeve shirt, long pants, boots)

→ Exposure limits: No exposure limits have been established for this material.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Light yellow, clear liquid

Odour: Very slight amine odour

→ pH: 11, approximately (1% solution)

Boiling point/boiling range: 104°C, approximately

Melting point/melting range: -25°C, approximately

Flash point: not flammable (aqueous solution)

Flammability: See Flash point

Autoflammability: See Flash point

Explosive properties: Not explosive

Oxidizing properties: Not an oxidizer

Vapour pressure: 25 mm Hg, approximately

Relative density (H_2O=1): 1.3, approximately

Bulk density: See Relative density

Other data: Volatiles = 58%, approximately

Solubility: Water- Miscible in all proportions
Fat (type)- Not miscible
Other solvents- Not determined

Partition coefficient (n-octanol/water): Not determined

10 STABILITY AND REACTIVITY

Conditions to avoid: None known.

Materials to avoid: Do not mix with strong oxidizing agents, or strong acids. Contact with aluminium may release flammable hydrogen gas. Will corrode steel and copper.

Hazardous decomposition products: Oxides of carbon, nitrogen, sulfur, sodium and iron, and cyanides may be released on burning or heating to decomposition.

11 TOXICOLOGICAL INFORMATION

Acute effects: Based on the properties of its components, may be irritating to the eyes and skin. May be “harmful” by swallowing; ingestion of large amounts may cause hypo-calcenic tetany (muscle cramps) with spontaneous recovery. Unlikely to be harmful in contact with skin (estimated dermal LD_{50} > 2,000 mg/kg, rat).

→Chronic effects: NTA has caused kidney tumours in rats and mice when administered orally in high concentrations. The tumours are based on organ damage that can only occur when extremely high threshold limit concentrations, as compared with possible human exposure, are exceeded in view of the potential degree of exposure, there should be no cancer risk to humans.

12 ECOLOGICAL INFORMATION

Based on the properties of its components, unlikely to be harmful to aquatic organisms (estimated LC_{50}>100 mg/l).

→Degradation: Readily biodegradable

13 DISPOSAL CONSIDERATIONS

Users should acquaint themselves with local regulations.

Material that cannot be used or chemically reprocessed and empty containers should be disposed of in accordance with all applicable regulations. Disposal may be carried out by evaporating and burning under controlled conditions at a licensed waste material processor; stack gases will need to be scrubbed; or by disposal at an approved landfill. Product containers should be thoroughly emptied before disposal. Generators of waste material are required to evaluate all waste for compliance with all applicable procedures and regulations.

14 TRANSPORT INFORMATION

Proper Shipping Name: CORROSIVE LIQUID, N.O.S. (Contains metal chelates which are corrosive to aluminium and/or carbon steel)

UN No.: 1760 Symbol:

Hazard Class: 8 Packing Group: III

ADR/RID Item No: 66 (c) HIN: 80 EAC: 2x

IATA/DGR limits: Passenger - 5 litre (1 litre non-UN packs) Cargo - 60 litre

IMDG/IMO Code: 8147 EmS: 8-15 MFAG: 760 Tremcard: 80G20

→ Marine Pollutant: No

Complies with International Maritime Dangerous Goods Code (IMDG Code).
Harmony Code Number (Schedule B Number): 3815.19.0000

U.S. DOT: Hazard Class Designation (when shipped in a non-bulk container only). Corrosive liquid, n.o.s., (contains metal chelates which are corrosive to aluminum and/or carbon steel), UN 1760, Class 8, PG III. Exempt from DOT regulations when transported by motor vehicle or rail car in a bulk packaging constructed of materials that will not react to dangerously with or be degraded by the corrosive material.

15 REGULATORY INFORMATION

Components listed as "dangerous" in Annex I to Commission Directive 67/548/EEC

Component or impurity	Annex I Number
None	None

Classified according to the Directives 67/548/EEC and 88/379/EEC, and their various amendments, and labelled as below:

(ARI-350 LO-CAT® CHELATE MAKE UP SOLUTION) - Contains Trisodium nitrilotriacetate
EC No. 225-768-6

Warning symbol	-	St. Andrew's Cross (Xn)	
Warning words	-	HARMFUL	
Risk phrases	-	R22:	Harmful if swallowed.
		R36/38:	Irritating to eyes and skin.
Safety Phrases	-	S26:	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
	-	S36/37/39:	Wear suitable protective clothing, gloves and eye/face protection.

16 OTHER INFORMATION

Germany - Wassergefährdungsklasse (WGK) = 1 (mildly water polluting), self-classification.

→ Inventories - All components are listed in EINECS.

Intended uses - Chelate make up solution used in **LO-CAT®** process. No other use is intended.

Revisions - The latest information changes are marked with → in the left margin.

The format of this Safety Data Sheet conforms to the requirements of Commission Directive 93/112/EC.

Disclaimer: The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the user thereof. It is the buyer's responsibility to ensure that its activities comply with federal, state, provincial and local laws.

REVISION 5: July 2001 SAFETY DATA SHEET Page 1/4

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of the Preparation: **ARI-400 LO-CAT® BIOCHEM**

1.2 Company: Gas Technology Products LLC
1501 E. Woodfield Road, Suite 200 West,
Schaumburg, IL 60173-5417, U.S.A.

1.3 Company Emergency Tel. No: USA 1-800-424 9300
International 001-703-527-3887

2 COMPOSITION/INFORMATION ON INGREDIENTS

Substance	CAS No.	% Present	EEC Symbol(s)	R-Phrases
Alkyl dimethylbenzyl ammonium chloride mixture (Alkyl = C12-18)	68956-79-6& 68391-01-5	<12	C (Corrosive)	22-34
Trisodium nitrilotriacetate	5064-31-3	<0.1	Xn (Harmful)	22-36/38
Other components and water	---	Up to 100	---	---

3 HAZARDS IDENTIFICATION

Harmful if swallowed. Corrosive - may cause severe damage to the eyes. Irritating to the skin.
→ Nitrilotriacetic acid and its salts are possibly carcinogenic to humans.

Toxic to aquatic organisms.

4 FIRST-AID MEASURES

→ In case of swallowing: Do not induce vomiting. If victim is alert and not convulsing rinse mouth with water and give plenty of water to drink. If spontaneous vomiting occurs, have affected person lean forward with head down to avoid breathing in of vomitus. Rinse mouth again and give more water to drink. Obtain medical attention.

→ In case of inhalation: Product is not volatile. If mist or aerosol is inhaled, remove affected person from area to fresh air and provide oxygen if breathing is difficult. Give artificial respiration ONLY if breathing has stopped and give CPR ONLY if there is no breathing and no pulse.

→ In case of contact with eyes: Immediately irrigate eyes with flowing water continuously for 15 minutes while holding eyes open. Contact lenses should be removed before or during flushing. Obtain medical attention immediately. DO NOT instruct person to neutralize.

→ In case of contact with skin: Immediately remove clothing from affected area and wash skin for 15 minutes with flowing water and soap. Clothing should be discarded or washed before reuse. Obtain medical attention immediately. DO NOT instruct person to neutralize affected skin area.

5 FIRE-FIGHTING MEASURES

Suitable extinguishing media: Will not burn until dried out; water jets may be used for cooling drums.

Extinguishing media which should NOT be used: None - use extinguishing media appropriate for primary cause of fire.

Special exposure hazards: May give off noxious fumes (e.g. oxides of carbon and nitrogen, ammonia and chlorinated compounds). Wear breathing apparatus and protective clothing. Prevent contamination of water systems.

→ Special protective equipment: Wear Self Contained Breathing Apparatus. Non-emergency personnel should be removed from the area immediately.

6 ACCIDENTAL RELEASE MEASURES

Observe any warning labels on the container (See Sections 14 and 15). Take precautions to avoid exposure (See Section 8).

→ Contain any spilled material immediately with dry agent (sand, vermiculite, etc.) and vacuum or shovel into labelled containers for disposal (See Section 13). DO NOT DUMP INTO ANY SEWERS, ON THE GROUND OR INTO ANY BODY OF WATER.

7 HANDLING AND STORAGE

7.1 → Handling: Handle/weigh this product under conditions of good local exhaust ventilation to avoid breathing mist or aerosol. Avoid swallowing and eye and skin contact. Use personal protective equipment (See Section 8).

7.2 → Storage: Product should be stored in a cool place above 5°C (41°F) in a tightly closed container. Store away from strong oxidizers, reducing agents and anionic materials. Product corrodes copper, steel and stainless steel (304 & 316).

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory Protection: Wear respiratory protection to prevent inhalation of irritant mists or aerosols if formed during handling.

→ Hand Protection: rubber gloves

Eye Protection: chemical goggles or eye/face shield

Skin Protection: proper work attire (ie. long sleeve shirt, long pants, boots)

→ Exposure limits: Exposure limits have not been established.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Light brown liquid	Odour: Slightly sweet
pH: 6.5, approximately	Boiling point/boiling range: 100°C, approximately
Melting point/melting range: 0°C, approximately	Flash point: Not flammable (aqueous solution).
Flammability: See Flash point	Autoflammability: See Flash point
Explosive properties: Not explosive	Oxidizing properties: Not an oxidiser
Vapour pressure: 38 mm Hg, approximately	Relative density (H_2O=1): 0.96, approximately
Bulk density: See Relative density	Other data: Volatiles = 89%, approximately
Solubility: Water- Miscible in all proportions Fat - Not determined	Partition coefficient (n-octanol/water): Not determined, but likely to be low

Other solvents- Soluble in methanol and acetone; Insoluble in diethyl ether and n-octanol.

10 STABILITY AND REACTIVITY

Conditions to avoid: None known.

→ Materials to avoid: Do not mix with strong oxidising agents, reducing agents and anionic materials. Corrodes copper, steel and stainless steel (304 & 316).

Hazardous decomposition products: Oxides of carbon and nitrogen, ammonia and chlorinated compounds may be released on burning or heating to decomposition.

11 TOXICOLOGICAL INFORMATION

→ Acute effects: Based on the properties of its components, this product may be “corrosive”. Therefore, it may cause serious damage in contact with eyes and may cause severe skin irritation. Inhalation of mists or aerosols may cause irritation of the respiratory system. Harmful if swallowed. May aggravate existing dermatitis.

→ Chronic effects: Trisodium nitrilotriacetate is classified by INTERNATIONAL AGENCY for RESEARCH on CANCER (IARC) as possibly carcinogenic to humans (Group 2B). These tests were made at levels which were far higher than anticipated human exposure levels and were associated with severe tissue damage. Therefore, no human effects are expected when precautions are taken to prevent acute effects given above.

12 ECOLOGICAL INFORMATION

Based on the properties of its components, this product may be acutely “toxic” or “harmful” to aquatic organisms (i.e. estimated LC50 = 1 to 100 mg/l). However, it is expected to be largely biodegradable and/or removed by water treatment processes. Prevent discharge to fishing waters.

13 DISPOSAL CONSIDERATIONS

→ Material that cannot be used or chemically reprocessed and empty containers should be disposed of in accordance with all applicable regulations. Disposal may be carried out by evaporating and burning under controlled conditions at a licensed waste material processor; stack gases will need to be scrubbed; or by disposal at an approved landfill. Product containers should be thoroughly emptied before disposal. Generators of waste material are required to evaluate all waste for compliance with all applicable procedures and regulations.

14 TRANSPORT INFORMATION

Proper Shipping Name: CORROSIVE LIQUID N.O.S.
(Contains quaternary ammonium compounds which are corrosive to aluminum and/or carbon steel).

UN No.: 1760 Symbol:

Hazard Class: 8 Packing Group: III

ADR/RID Item No: 66 (c) HIN: 80 EAC: 2x

IATA/DGR limits: Passenger - 5 litre (1 Litre non-UN packs)

IMDG/IMO Code: 8147 EmS: 8-15 MFAG: 760 Tremcard: 80G20

Complies with International Maritime Dangerous Goods Code (IMDG Code)
Harmony Code Number (Schedule B Number): 3808.90.0000

15 REGULATORY INFORMATION

Components listed as "dangerous" in Annex I to Commission Directive 67/548/EEC

Component or impurity	Annex I Number
None	not applicable

Classified according to the Directives 67/548/EEC and 88/379/EEC, and their various amendments, and labelled as below:

(ARI-400 LO-CAT® BIOCHEM) - Contains quaternary ammonium compounds

Warning symbol - Corrosive (C)

Warning words	-	CORROSIVE	
Risk phrases	-	R34:	Causes burns.
Safety Phrases	-	S26:	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
		S36/37/39:	Wear suitable protective clothing, gloves and eye/face protection.

16 OTHER INFORMATION

Germany - Wassergefährdungsklasse (WGK) = 3 (strongly water polluting), self- classification.
Inventories - All components are listed in EINECS and TSCA.
Intended uses - Biostat used in **LO-CAT®** process. No other use is intended.
Revisions - The latest information changes are marked with → in the left margin

The format of this Safety Data Sheet conforms to the requirements of Commission Directive 93/112/EC.

Disclaimer: The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the user thereof. It is the buyer's responsibility to ensure that its activities comply with federal, state, provincial and local laws.

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of the Preparation: **ARI-600 LO-CAT® SURFACTANT**

1.2 Company:

Gas Technology Products LLC
1501 E. Woodfield Road, Suite 200 West,
Schaumburg, IL 60173-5417, U.S.A.

1.3 Company Emergency Tel. No:

USA 1-800-424 9300
International 001-800 424 9300

2 COMPOSITION/INFORMATION ON INGREDIENTS

	Substance	CAS No.	% Present	EEC Symbol(s)	R-Phrases
	Nonylphenol $C_{1.5}$ ethoxylate	68412-54-4	<1	Xi (Irritant)	36/37
→	Nonylphenol C_9 ethoxylate	68412-54-4	<30	Xi (Irritant)	36/37
	Isopropyl alcohol	67-63-0	<3	F (Flammable)	11
	Other components and water	----	Up to 100	----	----

3 HAZARDS IDENTIFICATION

Contact with eyes may cause irritation. Inhalations of mist or aerosol may irritate the respiratory system. May be toxic or harmful to aquatic organisms.

4 FIRST-AID MEASURES

→ In case of swallowing: Do not induce vomiting. If victim is alert and not convulsing rinse mouth with water and give plenty of water to drink. If spontaneous vomiting occurs, have affected person lean forward with head down to avoid breathing in of vomitus. Rinse mouth again and give more water to drink. Obtain medical attention.

→ In case of inhalation: Remove affected person from area to fresh air and provide oxygen if breathing is difficult. Give artificial respiration ONLY if breathing has stopped and give CPR ONLY if there is no breathing and no pulse. Obtain medical attention if irritation develops.

→ In case of contact with eyes: Immediately irrigate eyes with flowing water continuously for 15 minutes while holding eyes open. Contact lenses should be removed before or during flushing. Seek medical assistance if irritation develops. DO NOT instruct person to neutralize.

→ In case of contact with skin: Immediately remove clothing from affected area and wash skin for 15 minutes with flowing water and soap. Clothing should be discarded or washed before reuse. Obtain medical assistance if irritation develops. DO NOT instruct person to neutralize affected skin area.

5 FIRE-FIGHTING MEASURES

Suitable extinguishing media: Will not burn until dried out; water jets may be used for cooling drums.

Extinguishing media which should NOT be used: None - use extinguishing media appropriate for primary cause of fire.

→ Special exposure hazards: Oxides of carbon may be released on burning or heating to decomposition. Prevent contamination of water systems.

→ Special protective equipment: Wear Self Contained Breathing Apparatus. Non-emergency personnel should be removed from the area immediately.

6 ACCIDENTAL RELEASE MEASURES

Observe any warning labels on the container (See Sections 14 and 15). Take precautions to avoid exposure (See Section 8).

→ Contain any spilled material immediately with dry agent (sand, vermiculite, etc.) and vacuum or shovel into labelled containers for disposal (See Section 13). DO NOT DUMP INTO ANY SEWERS, ON THE GROUND OR INTO ANY BODY OF WATER.

7 HANDLING AND STORAGE

7.1 → Handling: Handle/weigh this product under conditions of good local exhaust ventilation to avoid breathing mist or aerosol. Avoid swallowing and eye and skin contact. Use personal protective equipment (See Section 8).

7.2 Storage: Store in a cool place above 5°C (41°F) and replace lid after use.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory Protection: Wear respiratory protection to prevent inhalation of irritant mists or aerosols, if formed during handling.

Hand Protection: rubber gloves or gauntlets

Eye Protection: goggles or eye/face shield

Skin Protection: proper work attire (ie. long sleeve shirt, long pants, boots)

Exposure limits:

		mg/m^3	
Occupational Exposure Levels	8h-TWA	Short-term	Reference
Isopropanol	980	1225 (15-min)	UK
→	983	1230 (15-min)	US-ACGIH TLV
→	980	---	US-OSHA PEL
→	980	1225	US- NIOSH REL
	980	1960 (30-min)	Germany
	490	-	Denmark
	350	600 (15-min)	Sweden
	245	-	Norway

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid

Odour: Slightly alcoholic

pH: 7.5, approximately

Boiling point/boiling range: 96°C, approximately

Melting point/melting range: 0°C, approximately

Flash point: Not flammable (aqueous solution).

Flammability: See Flash point

Autoflammability: See Flash point

Explosive properties: Not explosive

Oxidizing properties: Not an oxidizer

Vapour pressure: 38 mm Hg, approximately

Relative density (H_2O=1): 1.02, approximately

Bulk density: See Relative density

Other data: Volatiles = 69%, approximately

Solubility: Water-Miscible in all proportions
Fat (type)-Not determined
Other solvents-Not determined

Partition coefficient (n-octanol/water): Not determined

10 STABILITY AND REACTIVITY

Conditions to avoid: None known.

Materials to avoid: Do not mix with strong oxidizing agents.

Hazardous decomposition products: Oxides of carbon may be released on burning or heating to decomposition.

11 TOXICOLOGICAL INFORMATION

Acute effects: Based on the properties of its components, this product may be an “irritant” in contact with eyes and mist or aerosol may irritate the respiratory system. Unlikely to be “harmful” by swallowing or in contact with skin (estimated oral and dermal LD_{50} >2,000 mg/kg, rat).

Chronic effects: Based on the properties of its components, this product is unlikely to be a skin sensitiser. Not tested for long-term effects. None known, but take precautions to prevent acute effects given above.

12 ECOLOGICAL INFORMATION

Based on the properties of its components, this product may be acutely “toxic” or “harmful” to aquatic organisms (i.e. estimated LC_{50} = 1 to 100 mg/l). However, it is expected to be largely biologically removed under normal waste-water treatment plant conditions.

13 DISPOSAL CONSIDERATIONS

→ Material that cannot be used or chemically reprocessed and empty containers should be disposed of in accordance with all applicable regulations. Disposal may be carried out by evaporating and burning under controlled conditions at a licensed waste material processor; stack gases will need to be scrubbed; or by disposal at an approved landfill. Product containers should be thoroughly emptied before disposal. Generators of waste material are required to evaluate all waste for compliance with all applicable procedures and regulations.

14 TRANSPORT INFORMATION

Proper Shipping Name: Not classified as dangerous for transport.

UN No.:	None	Symbol:	None
Hazard Class:	None		
ADR/RID Item No:	None		
IATA/DGR limits:	None		
IMDG/IMO Code:	None		

Complies with International Maritime Dangerous Goods Code (IMDG Code).
Harmony Code Number (Schedule B Number); 3402.13.0000

15 REGULATORY INFORMATION

Components listed as "dangerous" in Annex I to Commission Directive 67/548/EEC

Component or impurity	Annex I Number
Isopropyl alcohol	603-003-00-0

Classified according to the Directives 67/548/EEC and 88/379/EEC, and their various amendments, and labelled as below:

(ARI-600 LO-CAT® SURFACTANT)

Warning symbol	-	St. Andrew's Cross (Xi)	
Warning words	-	IRRITANT	
Risk phrases	-	R36/37:	Irritating to eyes and respiratory system.
Safety Phrases	-	S26:	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
	-	S36/37/39:	Wear suitable protective clothing, gloves and eye/face protection.

16 OTHER INFORMATION

Germany - Wassergefährdungsklasse (WGK) = 1 (mildly water polluting), self-classification.

Inventories - All components are listed in TSCA.

Intended uses - Surfactant used in **LO-CAT®** process. No other use is intended.

Revisions - The latest information changes are marked with → in the left margin

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Disclaimer: The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the user thereof. It is the buyer's responsibility to ensure that its activities comply with federal, state, provincial and local laws.

AMERICAN SCIENTIFIC LABORATORIES, LLC
Environmental Testing Services
2520 N. San Fernando Rd., Los Angeles, CA 90065 Tel: (323) 223-9700 Fax: (323) 223-9500

Ordered By

CAL ENERGY MINERALS, LLC
7030 Gentry Road
Calipatria, CA 92233-

Telephone (760)348-4000
Attn Cesar Flores

Number of Pages 19
Date Received 11/01/2002
Date Reported 11/13/2002

Job Number	Ordered	Client
15853	11/01/2002	CEM

Project ID: 17104
Project Name: Annual Filter Cake Analysis
Site: Cal Energy

Enclosed are the results of analyses on 4 samples analyzed as specified on attached chain of custody.

Wendy Lu
Organics Supervisor

Rojert G. Araghi
Laboratory Director

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ANALYTICAL RESULTS

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Cal Energy

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Attn: Cesar Flores

Page: 2
Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: 300, Soluble Fluoride by Ion Chromatography

Batch No:

Our Lab I.D.		96696	96697	96698	96699	
Sample ID		Elmore Plant F.C.	Leathers Plant F.C.	Region 1 Filter Cake	Region 2 Filter Cake	
Date Sampled		10/30/2002	10/30/2002	10/30/2002	10/30/2002	
Date Extracted		11/04/2002	11/04/2002	11/04/2002	11/04/2002	
Preparation Method						
Date Analyzed		11/04/2002	11/04/2002	11/04/2002	11/04/2002	
Matrix		Solid	Solid	Solid	Solid	
Units		mg/Kg	mg/Kg	mg/Kg	mg/Kg	
Detection Limit Multiplier		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
Conventionals						
Fluoride	5.00	ND	ND	7.63	ND	

QUALITY CONTROL REPORT

Batch No:

Analytes	LCS % REC	LCS/LCSD % Limit								
Conventionals										
Fluoride	118	80-120								

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Page: 3
Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: 300, Total Fluoride by Ion Chromatography

Batch No:

Our Lab I.D.		96696	96697	96699		
Sample ID		Elmore Plant F.C.	Leathers Plant F.C.	Region 2 Filter Cake		
Date Sampled		10/30/2002	10/30/2002	10/30/2002		
Date Extracted		11/06/2002	11/06/2002	11/06/2002		
Preparation Method						
Date Analyzed		11/06/2002	11/06/2002	11/06/2002		
Matrix		Solid	Solid	Solid		
Units		mg/Kg	mg/Kg	mg/Kg		
Detection Limit Multiplier		1	1	1		
Analytes	**PQL**	**Results**	**Results**	**Results**		
Conventionals						
Fluoride	1.00	ND	ND	ND		

QUALITY CONTROL REPORT

Batch No:

Analytes	LCS % REC	LCS/LCSD % Limit								
Conventionals										
Fluoride	98	80-120								

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Page: 4
Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: 300, Total Fluoride by Ion Chromatography

Batch No:

Our Lab I.D.		96698				
Sample ID		Region I Filter Cake				
Date Sampled		10/30/2002				
Date Extracted		11/06/2002				
Preparation Method						
Date Analyzed		11/06/2002				
Matrix		Solid				
Units		mg/Kg				
Detection Limit Multiplier		5				
Analytes	**PQL**	**Results**				
Conventionals						
Fluoride	5	36				

QUALITY CONTROL REPORT

Batch No:

Analytes	LCS % REC	LCS/LCSD % Limit								
Conventionals										
Fluoride	98	80-120								

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Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: 6010B/7470A, STLC Title 22 Metals

Our Lab I.D.		96696	96697	96698	96699	
Sample ID		Elmore Plant F.C.	Leathers Plant F.C.	Region 1 Filter Cake	Region 2 Filter Cake	
Date Sampled		10/30/2002	10/30/2002	10/30/2002	10/30/2002	
Date Extracted		11/05/2002	11/05/2002	11/05/2002	11/05/2002	
Preparation Method						
Date Analyzed		11/07/2002	11/07/2002	11/07/2002	11/07/2002	
Matrix		Solid	Solid	Solid	Solid	
Units		mg/L	mg/L	mg/L	mg/L	
Detection Limit Multiplier		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
AA Metals						
Mercury (soluble)	0.02	ND	ND	ND	ND	
ICP Metals						
Antimony (soluble)	1.5	ND	1.58	ND	ND	
Arsenic (soluble)	0.50	0.98	2.80	3.20	1.77	
Barium (soluble)	1.0	42.1	3.44	2.46	9.99	
Beryllium (soluble)	0.08	ND	0.10	ND	ND	
Cadmium (soluble)	0.10	ND	0.12	ND	ND	
Chromium (soluble)	0.50	ND	ND	ND	ND	
Cobalt (soluble)	0.80	ND	ND	ND	ND	
Copper (soluble)	0.25	1.19	0.76	0.53	1.05	
Lead (Soluble)	0.50	0.87	1.46	0.62	2.18	
Molybdenum (soluble)	0.35	ND	ND	ND	ND	
Nickel (soluble)	0.20	ND	ND	ND	ND	
Selenium (soluble)	0.25	ND	ND	ND	ND	
Silver (soluble)	0.50	ND	ND	ND	ND	
Thallium (soluble)	0.70	ND	ND	ND	ND	
Vanadium (soluble)	0.20	ND	ND	ND	ND	
Zinc (soluble)	0.25	14.2	15.5	3.29	16.1	

QUALITY CONTROL REPORT

Analytes	LCS % REC	LCS/LCSD % Limit								
AA Metals										
Mercury (soluble)	102	80-120								
ICP Metals										

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ANALYTICAL RESULTS

Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: 6010B/7470A, STLC Title 22 Metals

QUALITY CONTROL REPORT

Analytes	LCS % REC	LCS/LCSD % Limit								
ICP Metals										
Antimony (soluble)	94	80-120								
Arsenic (soluble)	94	80-120								
Barium (soluble)	96	80-120								
Beryllium (soluble)	94	80-120								
Cadmium (soluble)	95	80-120								
Chromium (soluble)	90	80-120								
Cobalt (soluble)	96	80-120								
Copper (soluble)	94	80-120								
Lead (Soluble)	93	80-120								
Molybdenum (soluble)	91	80-120								
Nickel (soluble)	96	80-120								
Selenium (soluble)	96	80-120								
Silver (soluble)	96	80-120								
Thallium (soluble)	95	80-120								
Vanadium (soluble)	90	80-120								
Zinc (soluble)	96	80-120								

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Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: 6010B/7471A, CCR Title 22 Metals (TTLC)

Batch No:

Our Lab I.D.		96696	96697	96698	96699	
Sample ID		Elmore Plant F.C.	Leathers Plant F.C.	Region 1 Filter Cake	Region 2 Filter Cake	
Date Sampled		10/30/2002	10/30/2002	10/30/2002	10/30/2002	
Date Extracted		11/07/2002	11/07/2002	11/07/2002	11/07/2002	
Preparation Method						
Date Analyzed		11/07/2002	11/07/2002	11/07/2002	11/07/2002	
Matrix		Solid	Solid	Solid	Solid	
Units		mg/Kg	mg/Kg	mg/Kg	mg/Kg	
Detection Limit Multiplier		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
AA Metals						
Mercury	0.20	ND	ND	ND	ND	
ICP Metals						
Antimony	0.50	90.8	129	13.6	20.8	
Arsenic	0.50	345	453	45.3	63.7	
Barium	0.50	2610	49.2	29.6	149	
Beryllium	0.50	20.0	40.0	0.62	1.83	
Cadmium	0.50	5.51	13.6	1.54	2.24	
Chromium	0.50	ND	ND	ND	ND	
Cobalt	0.50	2.42	ND	ND	ND	
Copper	0.50	53.4	26.1	7.13	14.0	
Lead	0.25	17.5	21.1	6.52	26.0	
Molybdenum	0.50	ND	ND	ND	ND	
Nickel	0.50	14.2	13.7	0.78	1.57	
Selenium	0.50	ND	ND	ND	ND	
Silver	0.50	27.6	50.6	18.9	56.8	
Thallium	0.50	ND	ND	ND	ND	
Vanadium	0.50	ND	ND	ND	ND	
Zinc	0.50	149	166	69.2	169	

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ANALYTICAL RESULTS

Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: 6010B/7471A, CCR Title 22 Metals (TTLC)

QUALITY CONTROL REPORT

Batch No:

Analytes	LCS % REC	LCS/LCSD % Limit								
AA Metals										
Mercury	102	80-120								
ICP Metals										
Antimony	95	80-120								
Arsenic	90	80-120								
Barium	92	80-120								
Beryllium	93	80-120								
Cadmium	96	80-120								
Chromium	89	80-120								
Cobalt	96	80-120								
Copper	94	80-120								
Lead	94	80-120								
Molybdenum	92	80-120								
Nickel	94	80-120								
Selenium	93	80-120								
Silver	88	80-120								
Thallium	97	80-120								
Vanadium	91	80-120								
Zinc	97	80-120								

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Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: 8260B, Volatile Organic Compounds

Batch No: 110602-2

Our Lab I.D.		96696	96697	96698	96699	
Sample ID		Elmore Plant F.C.	Leathers Plant F.C.	Region 1 Filter Cake	Region 2 Filter Cake	
Date Sampled		10/30/2002	10/30/2002	10/30/2002	10/30/2002	
Date Extracted		11/07/2002	11/07/2002	11/07/2002	11/07/2002	
Preparation Method						
Date Analyzed		11/07/2002	11/07/2002	11/07/2002	11/07/2002	
Matrix		Solid	Solid	Solid	Solid	
Units		ug/kg	ug/kg	ug/kg	ug/kg	
Detection Limit Multiplier		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
Acetone	50.0	ND	ND	ND	ND	
Benzene	2.00	ND	ND	ND	ND	
Bromobenzene (Phenyl bromide)	10.00	ND	ND	ND	ND	
Bromochloromethane (Chlorobromomethane)	10.00	ND	ND	ND	ND	
Bromodichloromethane (Dichlorobromomethane)	10.00	ND	ND	ND	ND	
Bromoform (Tribromomethane)	50.00	ND	ND	ND	ND	
Bromomethane (Methyl bromide)	30.00	ND	ND	ND	ND	
2-Butanone (MEK, Methyl ethyl ketone)	50.00	ND	ND	ND	ND	
n-Butylbenzene	10.00	ND	ND	ND	ND	
sec-Butylbenzene	10.00	ND	ND	ND	ND	
tert-Butylbenzene	10.00	ND	ND	ND	ND	
Carbon disulfide	10.00	ND	ND	ND	ND	
Carbon tetrachloride (Tetrachloromethane)	10.00	ND	ND	ND	ND	
Chlorobenzene	10.00	ND	ND	ND	ND	
Chloroethane	30.00	ND	ND	ND	ND	
2-Chloroethyl vinyl ether	50.00	ND	ND	ND	ND	
Chloroform (Trichloromethane)	10.00	ND	ND	ND	ND	
Chloromethane (Methyl chloride)	30.00	ND	ND	ND	ND	
4-Chlorotoluene (p-Chlorotoluene)	10.00	ND	ND	ND	ND	
2-Chlorotoluene (o-Chlorotoluene)	10.00	ND	ND	ND	ND	
1,2-Dibromo-3-chloropropane (DBCP)	50.00	ND	ND	ND	ND	
Dibromochloromethane	10.00	ND	ND	ND	ND	
1,2-Dibromoethane (EDB, Ethylene dibromide)	10.00	ND	ND	ND	ND	
Dibromomethane	10.00	ND	ND	ND	ND	
1,2-Dichlorobenzene (o-Dichlorobenzene)	10.00	ND	ND	ND	ND	

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ANALYTICAL RESULTS

Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: 8260B, Volatile Organic Compounds

Batch No: 110602-2

Our Lab I.D.		96696	96697	96698	96699	
Sample ID		Elmore Plant F.C.	Leathers Plant F.C.	Region 1 Filter Cake	Region 2 Filter Cake	
Date Sampled		10/30/2002	10/30/2002	10/30/2002	10/30/2002	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
1,3-Dichlorobenzene (m-Dichlorobenzene)	10.00	ND	ND	ND	ND	
1,4-Dichlorobenzene (p-Dichlorobenzene)	10.00	ND	ND	ND	ND	
Dichlorodifluoromethane	30.00	ND	ND	ND	ND	
1,1-Dichloroethane	10.00	ND	ND	ND	ND	
1,2-Dichloroethane	10.00	ND	ND	ND	ND	
1,1-Dichloroethene (1,1-Dichloroethylene)	10.00	ND	ND	ND	ND	
cis-1,2-Dichloroethene	10.00	ND	ND	ND	ND	
trans-1,2-Dichloroethene	10.00	ND	ND	ND	ND	
1,2-Dichloropropane	10.00	ND	ND	ND	ND	
1,3-Dichloropropane	10.00	ND	ND	ND	ND	
2,2-Dichloropropane	10.00	ND	ND	ND	ND	
1,1-Dichloropropene	10.00	ND	ND	ND	ND	
cis-1,3-Dichloropropene	10.00	ND	ND	ND	ND	
trans-1,3-Dichloropropene	10.00	ND	ND	ND	ND	
Ethylbenzene	2.00	ND	ND	ND	ND	
Hexachlorobutadiene (1,3-Hexachlorobutadiene)	30.00	ND	ND	ND	ND	
2-Hexanone	50.00	ND	ND	ND	ND	
Isopropylbenzene	10.00	ND	ND	ND	ND	
p-Isopropyltoluene (4-Isopropyltoluene)	10.00	ND	ND	ND	ND	
MTBE	5.00	ND	ND	ND	ND	
4-Methyl-2-pentanone (MIBK, Methyl isobutyl ketone)	50.00	ND	ND	ND	ND	
Methylene chloride (Dichloromethane, DCM)	50.00	ND	ND	ND	ND	
Naphthalene	10.00	ND	ND	ND	ND	
n-Propylbenzene	10.00	ND	ND	ND	ND	
Styrene	10.00	ND	ND	ND	ND	
1,1,1,2-Tetrachloroethane	10.00	ND	ND	ND	ND	
1,1,2,2-Tetrachloroethane	10.00	ND	ND	ND	ND	
Tetrachloroethene (Tetrachloroethylene)	10.00	ND	ND	ND	ND	
Toluene (Methyl benzene)	2.00	ND	ND	ND	ND	
1,2,3-Trichlorobenzene	10.00	ND	ND	ND	ND	
1,2,4-Trichlorobenzene	10.00	ND	ND	ND	ND	
1,1,1-Trichloroethane	10.00	ND	ND	ND	ND	
1,1,2-Trichloroethane	10.00	ND	ND	ND	ND	
Trichloroethene (TCE)	10.00	ND	ND	ND	ND	
Trichlorofluoromethane	10.00	ND	ND	ND	ND	
1,2,3-Trichloropropane	10.00	ND	ND	ND	ND	
1,2,4-Trimethylbenzene	10.00	ND	ND	ND	ND	
1,3,5-Trimethylbenzene	10.00	ND	ND	ND	ND	
Vinyl acetate	50.0	ND	ND	ND	ND	
Vinyl chloride (Chloroethene)	30.00	ND	ND	ND	ND	

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ANALYTICAL RESULTS

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Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: 8260B, Volatile Organic Compounds

Batch No: 110602-2

Our Lab I.D.		96696	96697	96698	96699	
Sample ID		Elmore Plant F.C.	Leathers Plant F.C.	Region 1 Filter Cake	Region 2 Filter Cake	
Date Sampled		10/30/2002	10/30/2002	10/30/2002	10/30/2002	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
o-Xylene	2.00	ND	ND	ND	ND	
m- & p-Xylenes	4.00	ND	ND	ND	ND	

Our Lab I.D.		96696	96697	96698	96699	
Surrogates	**Con.Limit**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	
Surrogate Percent Recovery						
Bromofluorobenzene	70-120	108	110	108	111	
Dibromofluoromethane	70-120	104	104	103	111	
Toluene-d8	70-120	107	106	107	109	

QUALITY CONTROL REPORT

Batch No: 110602-2

Analytes	MS % REC	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit					
Benzene	88	94	6.6	75-120	15					
Chlorobenzene	107	114	6.3	75-120	15					
1,1-Dichloroethene (1,1-Dichloroethylene)	87	96	9.8	75-120	15					
MTBE	86	93	7.8	75-120	15					
Toluene (Methyl benzene)	88	94	6.6	75-120	15					
Trichloroethene (TCE)	118	120	1.7	75-120	15					

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ANALYTICAL RESULTS

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Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: 9045C, Soil and Waste pH

Batch No:

Our Lab I.D.		96696	96697	96698	96699	
Sample ID		Elmore Plant F.C.	Leathers Plant F.C.	Region 1 Filter Cake	Region 2 Filter Cake	
Date Sampled		10/30/2002	10/30/2002	10/30/2002	10/30/2002	
Date Extracted		11/01/2002	11/01/2002	11/01/2002	11/01/2002	
Preparation Method						
Date Analyzed		11/01/2002	11/01/2002	11/01/2002	11/01/2002	
Matrix		Solid	Solid	Solid	Solid	
Units		pH Units	pH Units	pH Units	pH Units	
Detection Limit Multiplier		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
Conventionals						
pH	1.00	5.75	6.09	4.02	4.63	

QUALITY CONTROL REPORT

Batch No:

Analytes	LCS % REC	LCS/LCSD % Limit								
Conventionals										
pH	100	80-120								

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Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: H2S, Test Method to Determine H2S Released from Wastes

Batch No:

Our Lab I.D.		96696	96697	96698	96699	
Sample ID		Elmore Plant F.C.	Leathers Plant F.C.	Region 1 Filter Cake	Region 2 Filter Cake	
Date Sampled		10/30/2002	10/30/2002	10/30/2002	10/30/2002	
Date Extracted		11/05/2002	11/05/2002	11/05/2002	11/05/2002	
Preparation Method						
Date Analyzed		11/05/2002	11/05/2002	11/05/2002	11/05/2002	
Matrix		Solid	Solid	Solid	Solid	
Units		mg/L	mg/L	mg/L	mg/L	
Detection Limit Multiplier		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
Conventionals						
Reactive Sulfide	0.50	ND	ND	ND	ND	

QUALITY CONTROL REPORT

Batch No:

Analytes	LCS % REC	LCS/LCSD % Limit								
Conventionals										
Reactive Sulfide	118	80-120								

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ANALYTICAL RESULTS

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Page: 14
Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: HCN, Test Method to Determine HCN Released from Waste

Batch No:

Our Lab I.D.		96696	96697	96698	96699	
Sample ID		Elmore Plant F.C.	Leathers Plant F.C.	Region 1 Filter Cake	Region 2 Filter Cake	
Date Sampled		10/30/2002	10/30/2002	10/30/2002	10/30/2002	
Date Extracted		11/05/2002	11/05/2002	11/05/2002	11/05/2002	
Preparation Method						
Date Analyzed		11/05/2002	11/05/2002	11/05/2002	11/05/2002	
Matrix		Solid	Solid	Solid	Solid	
Units		mg/L	mg/L	mg/L	mg/L	
Detection Limit Multiplier		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
Conventionals						
Reactive Cyanide	0.50	ND	ND	ND	ND	

QUALITY CONTROL REPORT

Batch No:

Analytes	LCS % REC	LCS/LCSD % Limit								
Conventionals										
Reactive Cyanide	82	80-120								

AMERICAN SCIENTIFIC LABORATORIES, LLC
Environmental Testing Services
2520 N. San Fernando Rd., Los Angeles, CA 90065 Tel: (323) 223-9700 Fax: (323) 223-9500

ANALYTICAL RESULTS

Ordered By

CAL ENERGY MINERALS, LLC
7030 Gentry Road
Calipatria, CA 92233-

Site

Cal Energy

Telephone: (760)348-4000
Attn: Cesar Flores

Page: 15
Project ID: 17104
Project Name: Annual Filter Cake Analysis

Job Number	Order Date	Client
15853	11/01/2002	CEM

Method: 1010, Flashpoint

Our Lab I.D.		96696	96697	96698	96699	
Sample ID		Elmore Plant F.C.	Leathers Plant F.C.	Region 1 Filter Cake	Region 2 Filter Cake	
Date Sampled		10/30/2002	10/30/2002	10/30/2002	10/30/2002	
Date Extracted		11/07/2002	11/07/2002	11/07/2002	11/07/2002	
Preparation Method						
Date Analyzed		11/07/2002	11/07/2002	11/07/2002	11/07/2002	
Matrix		Solid	Solid	Solid	Solid	
Units		degree F	degree F	degree F	degree F	
Detection Limit Multiplier		1	1	1	1	
Analytes	**PQL**	**Results**	**Results**	**Results**	**Results**	
Conventionals						
Flashpoint	70	>200	>200	>200	>200	

AQUATIC BIOASSAY AND CONSULTING LABORATORIES, INC.
29 North Olive Street
Ventura, CA 93001
(805) 643-5621

DOHS Bioassay for Hazardous Waste (Title 22)

SAMPLE INFORMATION

CLIENT:	American Scientific Labs.,In	Date:	11/04/02
SAMPLE I.D.:	#96696	LAB #	ASL1102.006

WATER QUALITY

DILUTION WATER Reconst. Fresh				AERATION: Single Bubble Air			
CONTROL HARDNESS				CONTROL ALKALINITY			
Beg:	69 mg/l	End:	72 mg/l	Beg:	39 mg/l	End:	42 mg/l
SAMPLE HARDNESS				SAMPLE ALKALINITY			
Beg:	63 mg/l	End:	67 mg/l	Beg:	41 mg/l	End:	44 mg/l

ORGANISM INFORMATION

SPECIES:	Pimephales promelas	DATE REC'D	10/11/02
COMMON NAME:	Fathead Minnow	AVERAGE LNTH:	36 mm
SOURCE:	Thomas Fish Co.	AVERAGE WT:	0.71 gm
CARRIER:	California Overnight	NO. FISH / TANK:	10

TEST DATA

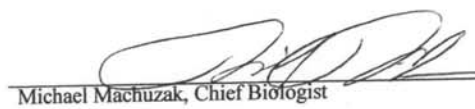
	INITIAL			24 HOURS				48 HOURS				72 HOURS				96 HOURS			
DATE:	11/04/02			11/05/02				11/06/02				11/07/02				11/08/02			
TIME:	1530			1530				1615				1500				1530			
CONC.	Dis. Oxy.	Temp. dg.C	pH	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead
0 (Con.)	8.7	19.0	7.5	8.5	18.8	7.8	0	8.7	18.9	7.9	0	8.9	18.3	7.9	0	7.9	19.5	7.7	0
400 mg/l	8.8	19.0	7.6	7.8	18.0	7.6	0	7.7	18.6	7.7	0	8.1	18.5	7.6	0	7.8	19.3	7.4	0
400 mg/l	8.9	19.0	7.6	7.8	18.0	7.6	0	7.8	18.6	7.7	0	8.1	18.5	7.5	0	7.7	19.3	7.4	0
750 mg/l	9.0	19.0	7.6	7.9	18.0	7.6	0	7.8	18.6	7.7	0	7.9	18.6	7.5	0	7.7	19.3	7.4	0
750 mg/l	8.8	19.0	7.6	7.9	18.0	7.6	0	7.9	18.6	7.7	0	7.9	18.5	7.5	0	7.8	19.3	7.4	0

FINAL DATA

TOTAL MORTALITIES	
0 (Con.)	0
400 mg/l	0
400 mg/l	0
750 mg/l	0
750 mg/l	0

FINAL RESULTS

96 HOUR LC50 =	>750 mg/l
STATUS =	Pass
CALCULATION METHOD =	Binomial Test



Date 11.13.02

Michael Machuzak, Chief Biologist

AQUATIC BIOASSAY AND CONSULTING LABORATORIES, INC.
29 North Olive Street
Ventura, CA 93001
(805) 643-5621

DOHS Bioassay for Hazardous Waste (Title 22)

SAMPLE INFORMATION

CLIENT:	American Scientific Labs.,In	Date:	11/04/02
SAMPLE I.D.:	#96697	LAB #	ASL1102.007

WATER QUALITY

DILUTION WATER Reconst. Fresh	AERATION: Single Bubble Air
CONTROL HARDNESS	CONTROL ALKALINITY
Beg: 69 mg/l End: 72 mg/l	Beg: 39 mg/l End: 42 mg/l
SAMPLE HARDNESS	SAMPLE ALKALINITY
Beg: 60 mg/l End: 62 mg/l	Beg: 38 mg/l End: 39 mg/l

ORGANISM INFORMATION

SPECIES:	Pimephales promelas	DATE REC'D	10/11/02
COMMON NAME:	Fathead Minnow	AVERAGE LNTH:	36 mm
SOURCE:	Thomas Fish Co.	AVERAGE WT:	0.71 gm
CARRIER:	California Overnight	NO. FISH / TANK:	10

TEST DATA

	INITIAL			24 HOURS				48 HOURS				72 HOURS				96 HOURS			
DATE:	11/04/02			11/05/02				11/06/02				11/07/02				11/08/02			
TIME:	1530			1530				1615				1500				1530			
CONC.	Dis. Oxy.	Temp. dg.C	pH	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead
0 (Con.)	8.7	19.0	7.5	8.5	18.8	7.8	0	8.7	18.9	7.9	0	8.9	18.3	7.9	0	7.9	19.5	7.7	0
400 mg/l	8.8	18.9	7.7	8.0	17.8	7.6	0	7.9	18.6	7.7	0	8.1	18.6	7.7	0	7.8	19.2	7.5	0
400 mg/l	8.8	18.8	7.7	8.0	17.9	7.6	0	7.9	18.6	7.7	0	8.1	18.6	7.7	0	7.8	19.2	7.5	0
750 mg/l	8.8	18.9	7.7	8.0	17.9	7.6	0	7.9	18.6	7.7	0	8.1	18.6	7.6	0	7.8	19.2	7.5	0
750 mg/l	8.7	19.0	7.7	7.9	18.0	7.6	0	8.0	18.6	7.7	0	8.0	18.6	7.5	0	7.9	19.2	7.5	0

FINAL DATA

TOTAL MORTALITIES	
0 (Con.)	0
400 mg/l	0
400 mg/l	0
750 mg/l	0
750 mg/l	0

FINAL RESULTS

96 HOUR LC50 =	>750 mg/l
STATUS =	Pass
CALCULATION METHOD =	Binomial Test

Date 11.13.02

Michael Machuzak, Chief Biologist

AQUATIC BIOASSAY AND CONSULTING LABORATORIES, INC.
29 North Olive Street
Ventura, CA 93001
(805) 643-5621

DOHS Bioassay for Hazardous Waste (Title 22)

SAMPLE INFORMATION

CLIENT:	American Scientific Labs.,In	Date:	11/04/02
SAMPLE I.D.:	#96698	LAB #	ASL1102.008

WATER QUALITY

DILUTION WATER Reconst. Fresh	AERATION: Single Bubble Air
CONTROL HARDNESS	CONTROL ALKALINITY
Beg: 69 mg/l End: 72 mg/l	Beg: 39 mg/l End: 42 mg/l
SAMPLE HARDNESS	SAMPLE ALKALINITY
Beg: 60 mg/l End: 60 mg/l	Beg: 32 mg/l End: 35 mg/l

ORGANISM INFORMATION

SPECIES:	Pimephales promelas	DATE REC'D	10/11/02
COMMON NAME:	Fathead Minnow	AVERAGE LNTH:	36 mm
SOURCE:	Thomas Fish Co.	AVERAGE WT:	0.71 gm
CARRIER:	California Overnight	NO. FISH / TANK:	10

TEST DATA

	INITIAL			24 HOURS				48 HOURS				72 HOURS				96 HOURS			
DATE:	11/04/02			11/05/02				11/06/02				11/07/02				11/08/02			
TIME:	1530			1530				1615				1500				1530			
CONC.	Dis. Oxy.	Temp. dg.C	pH	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead
0 (Con.)	8.7	19.0	7.5	8.5	18.8	7.8	0	8.7	18.9	7.9	0	8.9	18.3	7.9	0	7.9	19.5	7.7	0
400 mg/l	8.9	19.1	7.6	7.9	17.8	7.6	0	7.7	18.6	7.7	0	7.6	18.6	7.7	0	7.7	19.2	7.5	0
400 mg/l	8.8	19.1	7.6	7.9	17.8	7.6	0	7.7	18.6	7.7	0	7.8	18.6	7.8	0	7.7	19.2	7.5	0
750 mg/l	8.8	19.1	7.6	7.9	17.8	7.6	0	7.7	18.6	7.7	0	7.7	18.6	7.7	0	7.7	19.2	7.5	0
750 mg/l	8.9	19.1	7.6	7.9	17.8	7.6	0	7.7	18.6	7.7	0	7.8	18.6	7.7	0	7.7	19.2	7.5	0

FINAL DATA

TOTAL MORTALITIES	
0 (Con.)	0
400 mg/l	0
400 mg/l	0
750 mg/l	0
750 mg/l	0

FINAL RESULTS

96 HOUR LC50 =	>750 mg/l
STATUS =	Pass
CALCULATION METHOD =	Binomial Test

Date 11.13.02

Michael Machuzak, Chief Biologist

AQUATIC BIOASSAY AND CONSULTING LABORATORIES, INC.
29 North Olive Street
Ventura, CA 93001
(805) 643-5621

DOHS Bioassay for Hazardous Waste (Title 22)

SAMPLE INFORMATION

CLIENT:	American Scientific Labs.,In	Date:	11/04/02
SAMPLE I.D.:	#96699	LAB #	ASL1102.009

WATER QUALITY

DILUTION WATER Reconst. Fresh			AERATION: Single Bubble Air		
CONTROL HARDNESS			CONTROL ALKALINITY		
Beg:	69 mg/l	End: 72 mg/l	Beg:	39 mg/l	End: 42 mg/l
SAMPLE HARDNESS			SAMPLE ALKALINITY		
Beg:	69 mg/l	End: 71 mg/l	Beg:	41 mg/l	End: 45 mg/l

ORGANISM INFORMATION

SPECIES:	Pimephales promelas	DATE REC'T	10/11/02
COMMON NAME:	Fathead Minnow	AVERAGE LNTH:	36 mm
SOURCE:	Thomas Fish Co.	AVERAGE WT:	0.71 gm
CARRIER:	California Overnight	NO. FISH / TANK:	10

TEST DATA

	INITIAL			24 HOURS				48 HOURS				72 HOURS				96 HOURS			
DATE:	11/04/02			11/05/02				11/06/02				11/07/02				11/08/02			
TIME:	1530			1530				1615				1500				1530			
CONC.	Dis. Oxy.	Temp. dg.C	pH	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead	Dis. Oxy.	Temp. dg.C	pH	#Fish Dead
0 (Con.)	8.7	19.0	7.5	8.5	18.8	7.8	0	8.7	18.9	7.9	0	8.9	18.3	7.9	0	7.9	19.5	7.7	0
400 mg/l	8.7	18.9	7.5	7.9	17.8	7.5	0	7.8	18.7	7.5	0	7.8	18.7	7.7	0	7.5	19.3	7.3	0
400 mg/l	8.7	18.9	7.5	7.9	17.8	7.5	0	7.8	18.7	7.5	0	7.8	18.7	7.7	0	7.5	19.3	7.3	0
750 mg/l	8.4	18.9	7.5	8.0	17.8	7.5	0	7.8	18.7	7.5	0	7.9	18.7	7.7	0	7.5	19.3	7.3	0
750 mg/l	8.5	18.9	7.5	7.9	17.8	7.6	0	7.7	18.7	7.5	0	7.8	18.7	7.7	0	7.5	19.2	7.3	0

FINAL DATA

TOTAL MORTALITIES	
0 (Con.)	0
400 mg/l	0
400 mg/l	0
750 mg/l	0
750 mg/l	0

FINAL RESULTS

96 HOUR LC50 =	>750 mg/l
STATUS =	Pass
CALCULATION METHOD =	Binomial Test

Michael Machuzak, Chief Biologist Date 11.13.02

MATERIAL SAFETY DATA SHEET

Section 1. Chemical Product and Company Identification

Product Identity **Precipitated Silica**

Synonyms: Amorphous Silica

Manufacturer's Name	Emergency Telephone Number (24 hr)
CalEnergy Operating Corporation	CHEMTREC®: 800-424-9300
Address (Number, Street)	Telephone Number for Information
7030 Gentry Road	760-348-4000
(City, State, and ZIP Code)	Date Prepared
Calipatria, CA 92233	12-19-02

Section 2. Typical Composition / Information on Ingredients (of precipitated silica)

Component in Dry Solids	CAS Registry #	Percent Concentration	Exposure Limits ACGIH TLV	Exposure Limits OSHA PEL
Silica (Amorphous)		60 – 90%		
Iron		1 – 16%		
Chloride		0.4 – 20%		
Sodium		0.2 – 5%		
Calcium		0.2 – 3%		
Potassium		0.1 – 2%		

Typical minor elements include aluminum (500-1400 ppm), antimony (300-800 ppm), arsenic (200-1400 ppm), barium (50-2000 ppm), copper (30-500 ppm), chromium (0-25 ppm), lead (0-300 ppm), manganese (800-8000 ppm), nickel (25-90 ppm), silver (60-900 ppm), strontium (50-6000 ppm), sulfate (20-2000 ppm), vanadium (0-80 ppm) and zinc (30-1000 ppm). This material contains trace levels of radionuclides. Moisture is approximately 30%.

Section 3. Hazards Identification (of precipitated silica)

POTENTIAL HEALTH EFFECTS:

TARGET ORGANS: Unknown.

EYE CONTACT: May cause moderate eye irritation.

INHALATION: Vapors are unlikely due to physical properties. Excessive exposure may cause irritation of upper respiratory tract and lungs.

SKIN CONTACT: May cause moderate eye irritation.

INGESTION: May cause toxic effects.

CARCINOGENICITY:
The following components of filter cake are known to the State of California to cause cancer: arsenic, cadmium, beryllium, nickel and radium (decay chain).
IARC –

NTP –

OSHA –

TERATOLOGY (BIRTH DEFECT) INFORMATION: There are some positive animal teratogenic tests for several of the components of precipitated silica.
REPRODUCTIVE INFORMATION: Lead is known to the State of California to cause reproductive toxicity.

MUTAGENICITY: There are some positive mutagenicity tests for several of the components of filter cake.

MATERIAL SAFETY DATA SHEET

Section 4. First Aid Measures – (of precipitated silica) - In all cases, seek qualified evaluation.

EYE CONTACT: Irrigate immediately with water for at least 15 minutes; mechanical effects only.

INHALATION: Refer to physician.

SKIN CONTACT: Wash off in flowing water or shower.

INGESTION: Refer to physician.

NOTES TO PHYSICIAN:

Section 5. Fire Fighting Measures (of precipitated silica)

FLAMMABLE PROPERTIES: FLASH POINT: Non-flammable METHOD USED: Not applicable

EXTINGUISHING MEDIA: N/A

FIRE & EXPLOSION HAZARDS: Not flammable

FIRE FIGHTING INSTRUCTIONS: N/A

FIRE FIGHTING EQUIPMENT: N/A

Section 6. Accidental Release Measures (of precipitated silica)

Vacuum spilled material and place in closed plastic bags/containers for disposal. If more than 3,330 Lbs of filter cake have been released to the environment, notify EPA within 24 hours at 1-800-424-8802 (National Response Center).

Section 7. Handling and Storage (of precipitated silica)

Storage Method: Store in a dry area. When transferring dry powder material into flammable solvents, use proper grounding to avoid electrical sparks. Product surface alterations caused by calcining (exposure to temperatures greater than 800 C) or mixing with additives may alter toxicology properties.

Section 8. Exposure Controls/Personal Protection (of precipitated silica)

ENGINEERING CONTROLS- Ventilation: These recommended precautions are intended for use during normal operating conditions. Emergency/upset conditions could require additional precautions.
Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.
RESPIRATORY PROTECTION- Inhalation:
Low/Moderate/High – Atmospheric levels should be maintained below the exposure guidelines. Use respiratory protection when in filter cake handling operations and areas. Clean or dust clothing, boots and gloves before leaving work area.

MATERIAL SAFETY DATA SHEET

Use NIOSH approved dust filter respirator for exposure above permissible exposure limits. The respiratory use limitations made by NIOSH or the manufacturer must be in observed. Respiratory protection programs must be in accordance with 29 CFR 1910.134

Boots, aprons, or chemical suits should be used when necessary to prevent skin contact. Personal protective clothing and use of equipment must be in accordance with 29 CFR 1910.132 (general requirements), .133 (eye face protection), and .138 (hand protection).

SKIN PROTECTION:
Clean body-covering clothing.

EYE PROTECTION:
Safety glasses.

Ingestion: Use good personal hygiene. Do not consume or store food or drink in work area. Wash hands before smoking or eating. Clean body covering clothing, boots and gloves after handling.

Exposure Guidelines:

Permissible Exposure Limits: 8-hour Time-Weighted-Average (TWA); 15 minute Short-Term Exposure Limit (STEL)

OSHA: 6 mg/m^3 (total amorphous dust) TWA. 3 mg/m^3 (respirable nuisance particulate) TWA.

ACGIH: 10 mg/m^3 (total amorphous dust) TWA. 3 mg/m^3 (respirable nuisance particulate) TWA.

Section 9. Physical and Chemical Properties (of precipitated silica)

APPEARANCE:	A very fine powder	**pH:**	N/A
ODOR:	None have been noticed	**BOILING POINT (°C):**	N/A
SOLUBILITY IN WATER:	Insoluble	**MELTING POINT (°C):**	N/A
EVAPORATION RATE:	N/A	**MOLECULAR WEIGHT:**	60 g/mol
VAPOR DENSITY:	N/A	**SPECIFIC GRAVITY:**	Approx. 2.5
VAPOR PRESSURE:	N/A		
Bulk Density:	Approx. 0.7 g/mL		
Moisture:	Approx. 20%		
BET Surface Area:	30 to 300 m^2/g		
Average Particle Size	10 Microns		

Section 10. Stability and Reactivity

CHEMICAL STABILITY: Stable under ordinary conditions of use and storage.

INCOMPATIBILITY: Reacts with hydrofluoric acid (HF).

HAZARDOUS DECOMPOSITION PRODUCTS: At very high temperatures, the material may emit sulfur oxide gases and metal fumes.

HAZARDOUS POLYMERIZATION: Will not occur.

MATERIAL SAFETY DATA SHEET

Section 11. Toxicological Information

Not tested.

Section 12. Ecological Information

ECOTOXICOLOGICAL INFORMATION: Not tested.

CHEMICAL FATE INFORMATION: Not tested.

Section 13. Disposal Considerations

This product may not be disposed of in a sanitary landfill, unless state and local regulations permit. Care should be taken to avoid creation of dust during handling and disposal operations.

Section 14. Transportation Information (Not meant to be all inclusive)

D.O.T. SHIPPING NAME:	Other regulated substances, solid, n.o.s.	**D.O.T. HAZARD CLASS:**	9
U.N./N.A. NUMBER:	3077	**PACKING GROUP:**	III
D.O.T. LABEL:	Misc. Dangerous Goods (9)		

Section 15. Regulatory Information (Not meant to be all inclusive – selected regulation represented)

OSHA STATUS:

TSCA STATUS:

CERCLA REPORTABLE QUANTITY:

SARA TITLE III:

.

RCRA STATUS:

Section 16. Other Information

NFPA® Ratings:	Health:	Flammability: 0	Reactivity:	Special Notice Key:
HMIS® Ratings:	Health:	Flammability: 0	Reactivity:	Protective Equipment: dust filter respirator

CalEnergy Operating Company
950 W. Lindsey Rd.
Calipatria, CA 92233
Phone: (760)348-4000

1. Geothermal Scale

2. Composition (Average concentration)

Major Elements	Probable Compounds	(Percent)
Silicon (Amorphous)	(SiO2+Silicates)	50
Iron	(Fe3O4+Fe2O3+FeSiO4+Fe+FeCO3)	18
Copper	(Cu+CuCl2+CuS)	10
Sodium	(NaCl)	5
Calcium	(CaSO4+CaCO3)	3
Potassium	(KCL)	3

Minor Elements	Probable Compounds	(PPM)
Aluminum	(Silicate)	10,000
Manganese	(MnS+MnSO4)	10,000
Strontium	(SrSO4)	10,000
Magnesium	(MgCO3)	7,500
Arsenic	(As+FeAs2)	30,000
Barium	(BaSO4)	5,000
Bismuth	(Bi2S3)	1,500
Lead	(PbS)	1,000
Antimony	(Sb+SbS)	1,000

Trace Elements	Probable Compounds	(PPM)
Silver	(Ag+AgS)	750
Cadmium	(Cd+CdS)	500
Chromium	(Cr2(SO4)3)	500
Cobalt	(CoS2)	500
Zinc	(ZnS)	400
Beryllium	(Be)	100
Gold	(Au)	2
Radium 226	(RaSO4)	60 pCi/g
Radium 228	(RaSO4)	45 pCi/g
Other Metals		<100

3. Chemical and Physical Properties

Appearance: Scale is a very heterogenous substance, composition will vary. Color ranges from light brown to black with greenish areas.

Density: Average - 2300 lbs./cubic yard

Solubility in water: Insoluble in water

Odor: None have been noticed

4. Fire and Explosion Hazard Data

No hazard due to fire or explosion expected.

5. Reactivity Data

Stability: Material is stable under ordinary conditions
Incompatibility: No incompatibilities have been noticed.
Hazardous Decomposition Products: At very high temperatures the materials may emit sulfur oxide gases and metal fumes
Hazardous Polymerization: No polymerization will occur.

6. Exposure Guideline

A review of exposure guidelines for all the components of scale was performed. Atmospheric levels should be maintained below the following exposure standards:

Arsenic: OSHA PEL: TWA 0.01mg(As)/M3

Beryllium: OSHA PEL: TWA 0.002mg(Cd)/M3

Cadmium: OSHA PEL: TWA 0.2mg(Cd)/M3
OSHA is also proposing new limits for Cadmium (FR, Vol 55, No 25, Feb. 6, 1990, Page 4052)

OSHA PEL: TWA 5ug(Cd)/M3 or
1ug(Cd)/M3

Lead: OSHA PEL: TWA 0.05MG(Pb)/M3

Radium: California Department of Health Services (CDOHS) has set air concentration standards, maximum permissible concentrations (MPC), for Radium (Ra) 226 at 5E-11 uCi/ml or air. A significant daughter product of the RA 226 decay chain is Lead 210 which has a MPC value of 1E-10 uCi/ml of air.

In the Ra 228 decay chain the CDOHS has set the MPC for Ra 228 at 4E-11 uCi/ml of air. A significant daughter product of the Ra 228 decay chain is Thorium 228 which has a MPC value of 6E-12 uCi/ml of air.

MPC values in the air are based on internal doses due to inhalation. In addition, the Department of Energy has established external dose limits as follows:

	Rems per Calendar Year
Whole Body	5.0

7. **Handling Precautions and Protective Equipment**

These recommended precautions are intended for use during normal operating conditions. Emergency/upset conditions could require additional precautions. (For an explanation of the low, moderate and high potential exposure categories or specific recommendations for your specific operation, contact the Safety Department.)

Eye

Low - Use Safety glasses
Moderate/High - Use chemical goggles

Skin

Low - No precautions other than clean body covering clothing;
Moderate/High - Use boots and gloves

Inhalation

Low/Moderate/High - Atmospheric levels should be maintained below the exposure guidelines. Use respiratory protection when in scale handling operations and areas. Clean or dust clothing, boots and gloves before leaving work area.

Ingestion

Use good personal hygiene. Do not consume or store food and drink in the work area. Wash hands before smoking or eating. Clean body covering clothing, boots and gloves after handling.

Ventilation

Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

Protective Equipment Information

There is no respirator test data available for this material. Data for related materials indicate that the following should be effective types of air-purifying respirators: dusts and radionuclides.

8. **Emergency Treatment and Medical Notes**

Eye

Irrigate immediately with water for at least 15 minutes.

Skin

Wash off in flowing water or shower

Ingestion

Refer to Physician

Inhalation

Refer to Physician

9. Potential Health Effects

This section includes possible adverse effects which could occur if this material is not handled in the recommended manner.

Eye

May cause moderate eye irritation

Skin

May cause moderate skin irritation

Ingestion

May cause toxic effects

Acute Inhalation

Vapors are unlikely due to physical properties. Excessive exposure may cause irritation of the eyes, upper respiratory tract and lungs.

Chronic Effects/Carcinogenicity

The following components of scale are known to the State of California to cause cancer: Arsenic, Cadmium, Beryllium and Radium (decay chain).

Teratogenic Effects

There are some positive animal teratogenic tests for several of the components of scale.

Reproductive Effects

Lead is known to the State of California to cause reproductive toxicity.

Mutagenicity

There are some positive mutagenicity tests for several of the components of scale.

10. Environmental and Disposal Information

Action to take for releases:

Reclaim all the material which was released. For any Scale releases refer to the CalEnergy Operating Co. Business Plan for local agency notification. If more than 200 lbs. of scale (fine particles) have been released to the environment, then EPA also has to be notified within 24 hours at 1-800-424-8802 (The National Response Center).

Disposal Method:

Scale should not be disposed of, but reclaimed and stored in a safe and proper manner. If scale needs to be disposed of, contact CalEnergy Operating Company's Environmental Manager.

MEMO
Imperial Irrigation District

Date: January 28, 2002

To: Carlos Villalon
Supt. General Water Operations Sect.
Water Department
Imperial Irrigation District
Ph. 760-339-9267 or ext. 7267

From: David Bradshaw DB
Krystella Biagi
Irrigation Management Unit
Fx. 760-355-1268
Ph. 760-339-9083 or 760-339-9089

Subject: Water History for Vail 4A – 459 & 460.

Per your request of historical water use information for the IID/SDCWA Water Transfer, IID water delivery records indicate the following: SEE SECOND PAGE

The baseline is calculated as the average annual water delivered from 1987 through 1995. excluding the highest and lowest years of record during that period. The IID Board has made no final determination on how to address those fields that show more than one year of no water use during the baseline period. For the purposes of your request, we have not used any year of zero water use in the baseline calculations. Therefore, the values indicated in this letter are preliminary estimates only and are subject to revision as the rules governing the On-Farm Program are finalized.

For your reference, we have attached a spreadsheet showing the annual water delivered to each parcel for which you requested information , as developed from IID historical water delivery data.

Please feel free to contact our office with any questions.

Thank you,
Irrigation Management Unit

CANAL	GATE PREFIX	Gate Suf.	Gate Ton.	ACRE	1987 WATER USE (AF)	1988 WATER USE (AF)	1989 WATER USE (AF)	1990 WATER USE (AF)	1991 WATER USE (AF)	1992 WATER USE (AF)	1993 WATER USE (AF)	1994 WATER USE (AF)	1995 WATER USE (AF)	MIN YEAR	MAX YEAR	Baseline (AF)	Baseline (AF/AC)
Cal Energy Obsidiary Energy Plant-Carlos Villalon ext. 7267																	
V4A	459		1	72	490.2	488.4	478.2	296.2	340.2	350.6	259.4	447.2	384.8	259.4	490.2	397.9	5.5
V4A	460		1	72	236.4	526.6	466.8	337.6	392.6	342.4	349.6	319.2	346	236.4	526.6	364.9	5.1

DRAFT

DB

72 ACRES x 5.5 AF/AC = 396 AF
72 ACRES x 5.1 AF/AC = 367 AF

Σ 763 AF

ATTACHMENT CDR-95

Summary of Pipeline Releases

Date	Facility Location	Location of Incident	Quantity (gallons)
10/23/2002	Del Ranch Power Plant	DR-12 and M-9 Production Header Flange	30
05/30/2002	Elmore Power Plant	Elmore 14 Production Header	Undetermined
05/30/2002	Elmore Power Plant	Elmore 14	678
05/29/2002	Del Ranch Power Plant	DR-IW-1	393
05/28/2002	Del Ranch Power Plant	DR-IW-6	Undetermined
05/27/2002	Del Ranch Power Plant	DR-IW-1	Undetermined
04/29/2002	Elmore Power Plant	Elmore 12	15
04/29/2002	Elmore Power Plant	Elmore 12	613
04/21/2002	Units 3, 4&5 (Reg. 1)	Sinclair 10	30
04/19/2002	Leathers Power Plant	Leathers	11,980
04/12/2002	Leathers Power Plant	Injection Header	3
03/29/2002	Elmore Power Plant	EL-6 Brine Header Flange	5
04/03/2002	Vulcan Power Plant	M-10 Well	5
03/19/2002	Elmore Power Plant	EL-6	100
01/25/2002	Units 3, 4&5 (Reg. 1)	Vonderahe 2 Production Line	800
07/28/2001	Units 3, 4&5 (Reg. 1)	Production Pipeline for IID-16	16,000
07/16/2001	Units 3, 4&5 (Reg. 1)	Production Pipeline for IID-16	100
05/21/2001	Unit 5 (Reg. 1)	Flange at Unit 5 Brine Line	280
07/08/2001	Units 3, 4&5 (Reg. 1)	IID 16 Well	800
05/02/2001	Units 3, 4&5 (Reg. 1)	Production Line for Von 3 Well	300
03/18/2001	Units 1 & 3 (Reg. 1)	Brine Transfer Line	680
04/09/2001	Units 3, 4&5 (Reg. 1)	Sinclair 27 Well	220
02/20/2001	Units 3, 4&5 (Reg. 1)	Vonderahe 2 Production Line	3,860
02/10/2001	Leathers Power Plant	Header pipeline for RR-18	200
02/02/2001	Leathers Power Plant	Under injection piping south of plant	1,500
01/20/2001	Leathers Power Plant	Production line leak near RR-9	380
11/20/2000	Units 3, 4&5 (Reg. 1)	Production line for Von 2 Well	2,500
08/18/2000	Elmore Power Plant	Under injection line	640
08/18/2000	Leathers Power Plant	Production line leak near RR-9	380
02/10/2000	Elmore Power Plant	Production line leak near RR-12	115
12/31/1998	Unit 3 Power Plant	Reinjection line to the west of Unit 3	1,100
10/18/1998	Unit 3 Power Plant	Pipeline valve between IID-16 and Von 3 - flange gasket leak	440

ATTACHMENT CDR-95
Summary of Pipeline Releases

Date	Facility Location	Location of Incident	Quantity (gallons)
		leak	
08/15/1998	Elmore Power Plant	Elmore Plant Vulcan IW-3	500
05/21/1998	Leathers Power Plant	Injection line	407
04/06/1998	Vulcan Power Plant	Production Line	200
01/10/1998	Elmore Power Plant	Under old production line near PIVs in plant	100
09/04/1997	Del Ranch Power Plant	Production header east of Vulcan	300
08/12/1997	Del Ranch Power Plant	Production line near transformer near DR-5	620
06/09/1997	Del Ranch Power Plant	Production line near DR-6	Undetermined
04/19/1997	Vulcan Power Plant	North pad near IW-6, East pad near IW-1	100
01/11/1997	Del Ranch Power Plant	DR-3 Production header	4,200
10/09/1995	Elmore Power Plant	Corner of Bannister Road & Hwy. 86	10
10/07/1995	Leathers Power Plant	Production line near DR-17	350
09/10/1995	Leathers Power Plant	Brine Production Pipeline	420
07/14/1995	Elmore Power Plant	EL-11 Well - leak between master & HIV	950
06/04/1995	Elmore Power Plant	Injection line near IW-4	520
04/28/1995	Elmore Power Plant	Injection line near IW-4	378
03/31/1995	Elmore Power Plant	Injection line near IW-4	113
01/31/1995	Leathers Power Plant	Production line near RR-11	5,850